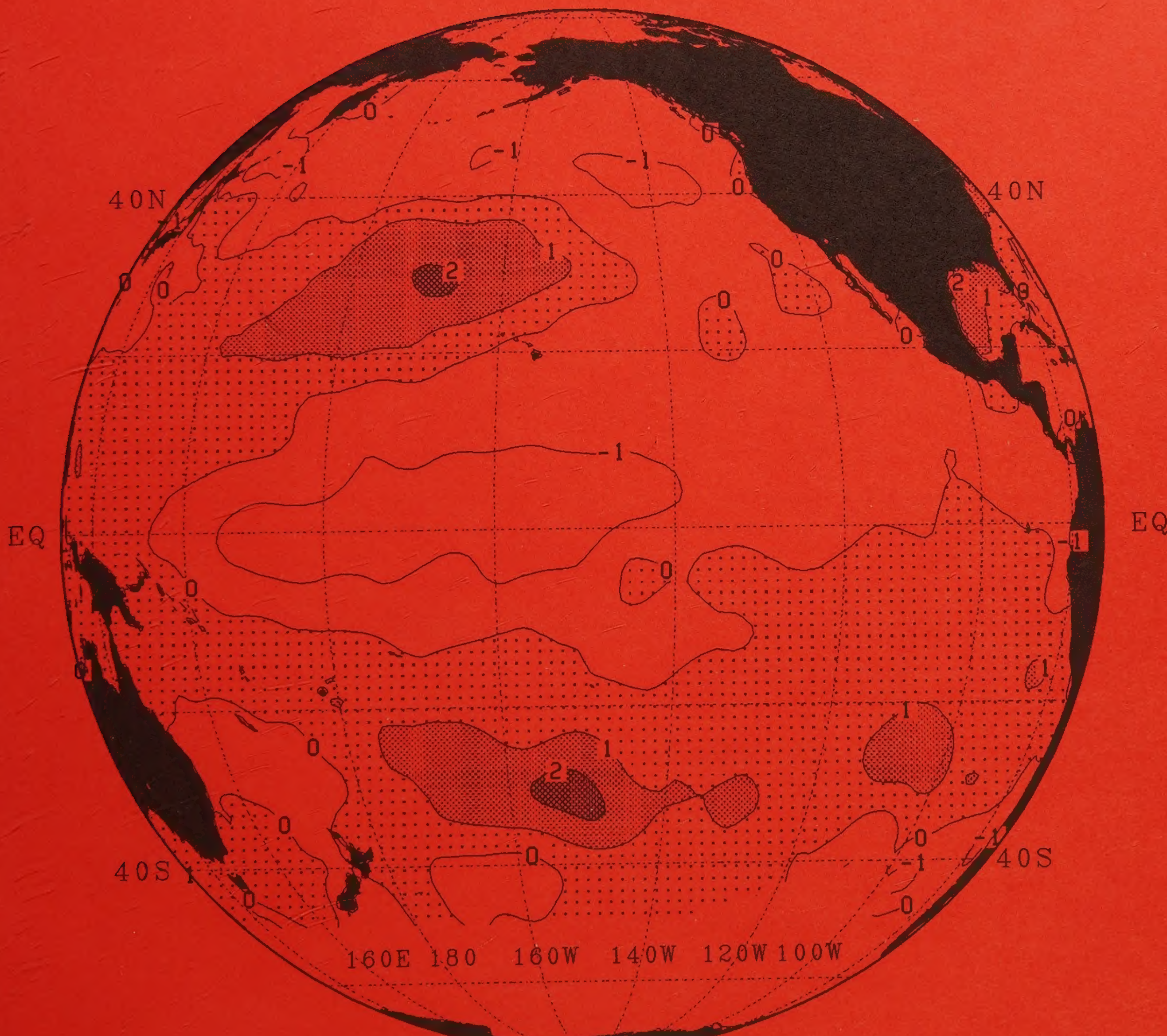
気象庁海洋月報

Monthly Ocean Report
March 2000 (No. 87)



Climate and Marine Department
Japan Meteorological Agency

気象庁 気候・海洋気象部

平成12年3月

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本月報に関する問い合わせは、

〒100-8122　東京都千代田区大手町 1 - 3 - 4　気象庁 気候・海洋気象部 海洋課まで。

電　話 (03) 3212-8341 (内線 5128、5129)

F A X (03) 3211-3047

電子メール ocean@hq.kishou.go.jp

Monthly Ocean Report is prepared by the Oceanographical Division, Climate and Marine Department, Japan Meteorological Agency.

Correspondence relating to this report may be directed to :

Masaro Saiki
Director, Oceanographical Division
Climate and Marine Department, Japan Meteorological Agency
1-3-4 Ote-machi, Chiyoda-ku, Tokyo 100-8122 Japan
Facsimile: +81-3-3211-3047
e-mail : ocean@hq.kishou.go.jp

表紙は、2000年3月の太平洋の月平均海面水温偏差図です。
陰影部は、平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for March 2000 in the Pacific Ocean.
Areas of positive anomalies are shaded.

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海況の特徴（２０００年３月）

日本近海の海況

海面水温は、千島列島の南で平年より1℃以上低く、日本海中部、九州西方及び三陸沖では0.5℃以上低かった（第４図）。

黒潮は、上・中旬は九州から室戸岬にかけて接岸した後、東南東に流れ、32°N、139°E付近で北に向きを変えていた。その後、上旬は八丈島の北で東に向きを変え、144°E付近で再び蛇行して常磐沖を東北東に流れていた。中旬は八丈島の南で東に向きを変えて流れていた。下旬は、潮岬付近で離岸して南東に流れ、31.5°N、138.5°E付近で北北東に向きを変え、八丈島付近を通って東北東に流れていた（第9図）。

親潮系の冷水の沿岸寄りの分枝は40.0°N、143.0°Eまで、沖合の分枝は39.5°N、146.5°Eまで達していた（第5図）。

太平洋の海況

太平洋赤道域の海面水温は、165°Eから140°Wにかけて平年より1℃以上低かった。一方、145°E以西では平年より0.5℃以上高かった。

北太平洋では、20°Nから40°Nの160°Eから150°Wにかけて平年より1℃以上高かった。一方、45°Nに沿った170°E以東は-0.5℃を超える負偏差となっていた。南太平洋では、30°Sに沿って170°Wから130°W及び110°Wから100°Wにかけて+1℃を超える正偏差となっていた（第16図）。

Highlights March 2000

Seas adjacent to Japan

Negative SST anomalies exceeding -1°C prevailed south of the Kuril Islands, and those exceeding -0.5°C prevailed in the central Japan Sea, west of Kyushu and off Sanriku (Fig. 4).

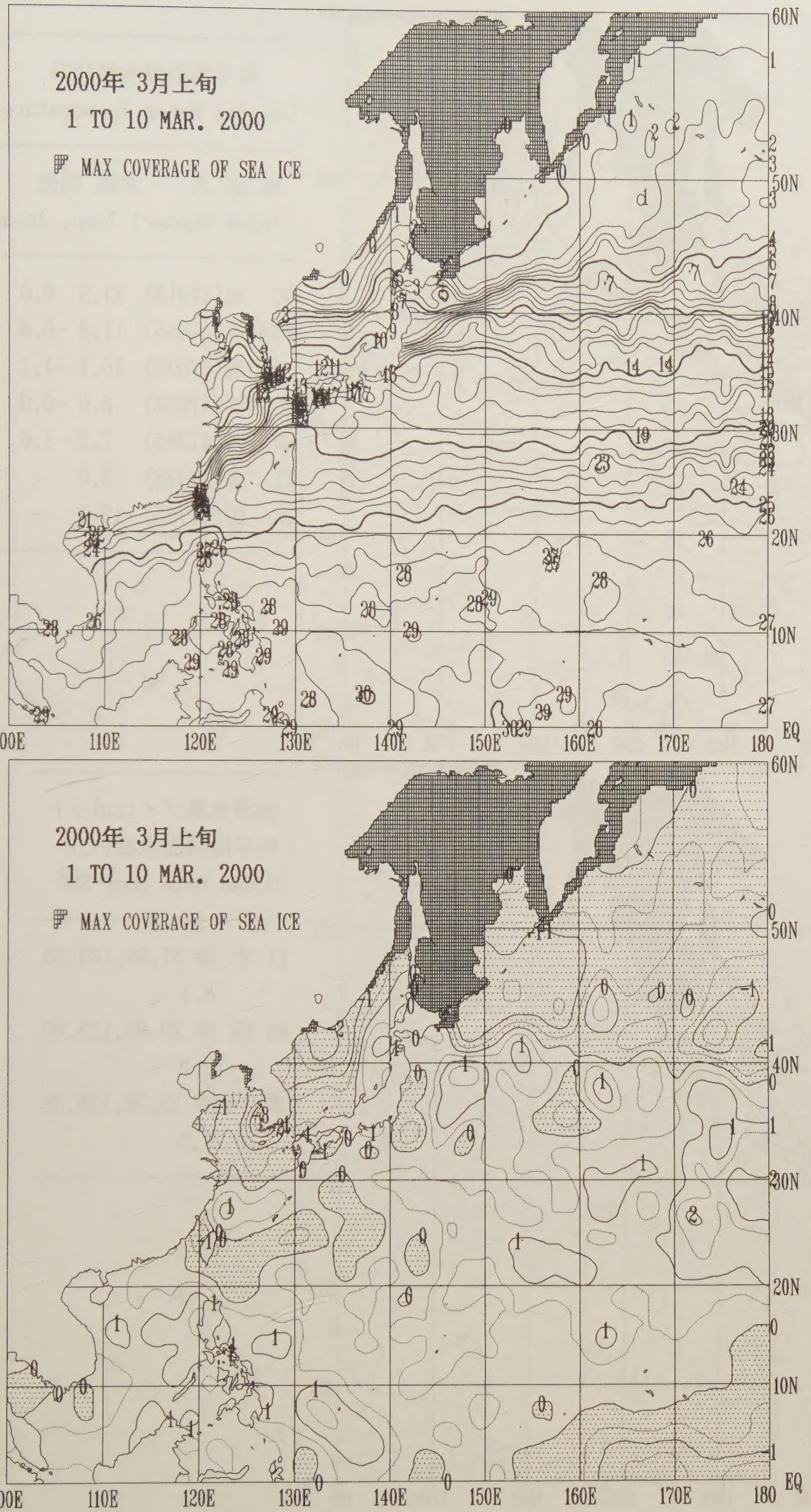
The Kuroshio flowed along the coasts from Kyushu to the Muroto-Misaki, then it flowed ESE-ward and turned northward at 32°N, 139°E in the first and second 10-days of the month. It turned eastward in the seas north of Hachijo Island, then meandered near 144°E and flowed ENE-ward off Joban in the first 10-day. In the second 10-day, it turned eastward in the seas south of Hachijo Island. In the last 10-day, the Kuroshio flowed SE-ward from off the Shiono-Misaki, turned NNE-ward at 31.5°N, 138.5°E and flowed ENE-ward passing near Hachijo Island (Fig. 9).

Coastal and off-coastal branches of the Oyashio cold water extended southward to 40.0°N, 143.0°E and 39.5°N, 146.5°E, respectively (Fig. 5).

Pacific Ocean

In the equatorial Pacific, negative SST anomalies exceeding -1°C prevailed from 165°E to 140°W. SSTs were more than 0.5°C above normal west of 145°E.

In the North Pacific, positive SST anomalies exceeding +1°C prevailed from 160°E to 150°W between 20°N and 40°N. Negative SST anomalies exceeding -0.5°C were found from 170°E eastward along 45°N. In the South Pacific, positive SST anomalies exceeding +1°C prevailed along 30°S from 170°W to 130°W and from 110°W to 100°W (Fig. 16).



旬平均沿岸水温(℃)
Coastal Water Temperature

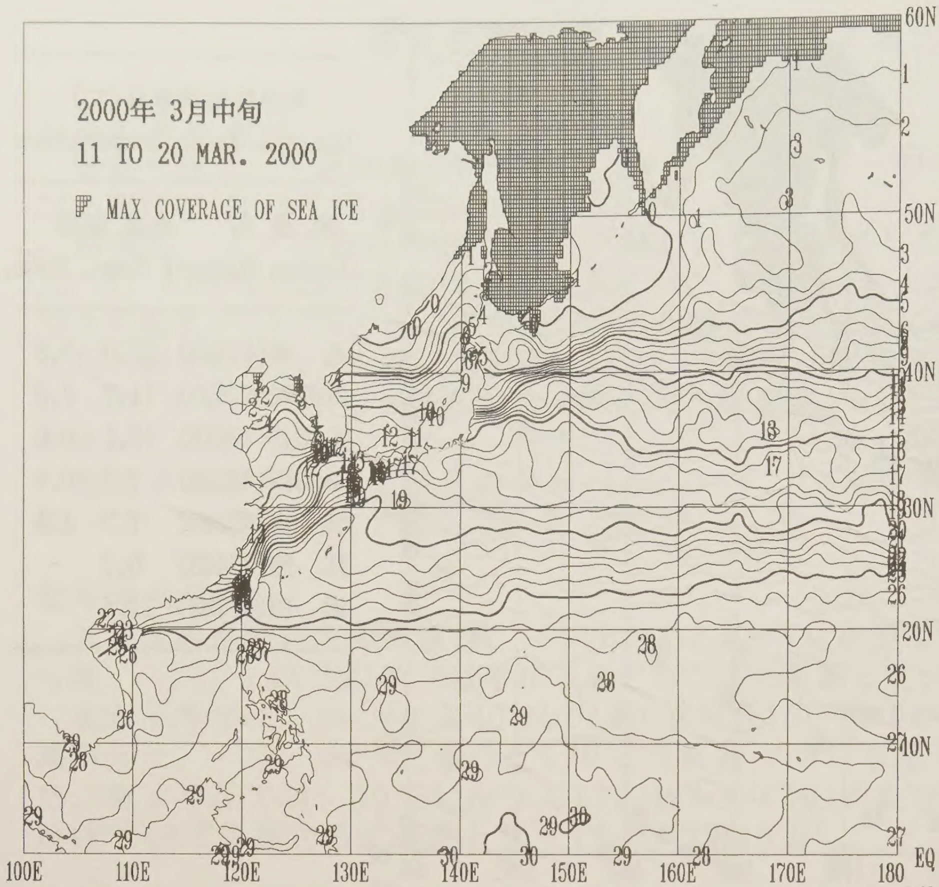
地点名 (Index Number)	水温 Temp.	偏差 Anom.
石 垣(47918)	22.0	0.8
御前崎(47655)	11.7	0.6
八丈島(47678)	17.1	0.6
小名浜(47598)	7.9	-0.9
宮 古(47585)	7.7	1.8
江 差(47428)	6.2	-
浜 田(47755)	11.5	-

海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

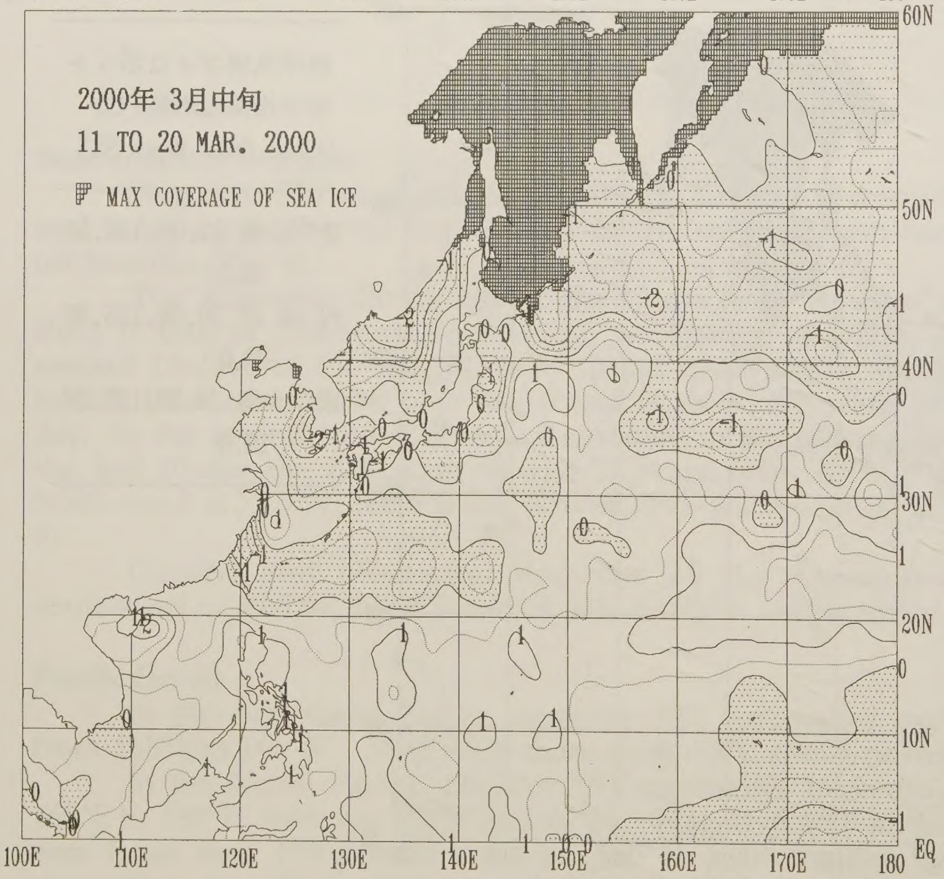
日本海	37.9N,134.5E	9.6
四国沖	29.0N,135.0E	19.0
東シナ海	28.2N,126.3E	19.9

第1図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(2000年 3月上旬)

Fig.1 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 1st ten-day period in MAR 2000. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃) Coastal Water Temperature		
地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	21.9	0.0
御前崎(47655)	11.4	-0.4
八丈島(47678)	16.1	-1.1
小名浜(47598)	8.0	-0.9
宮　古(47585)	7.2	1.6
江　差(47428)	5.0	-
浜　田(47755)	12.2	-

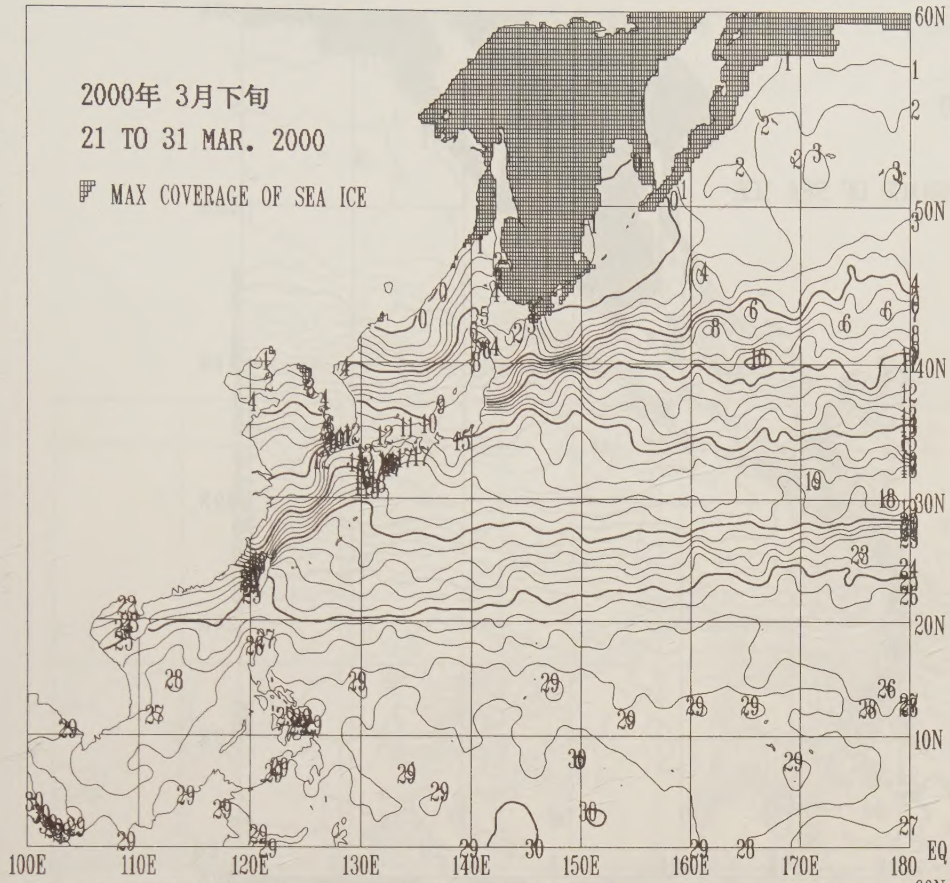


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

地点	位置	水温
日本海	37.9N,134.5E	8.1
四国沖	29.0N,135.0E	19.0
東シナ海	28.2N,126.3E	21.5

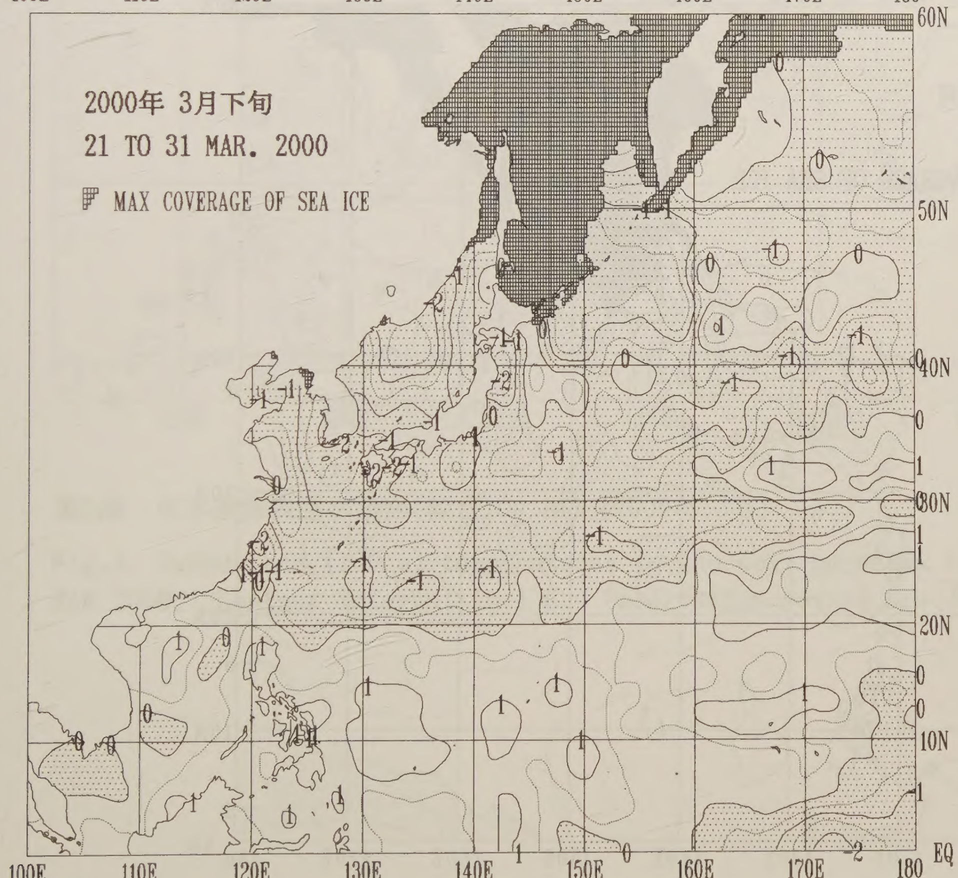
第2図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(2000年 3月中旬)

Fig.2 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 2nd ten-day period in MAR 2000. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)
Coastal Water Temperature

地 点 名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	22.3	0.0
御前崎(47655)	12.2	-0.5
八丈島(47678)	17.6	0.1
小名浜(47598)	8.5	-0.4
宮　古(47585)	6.9	1.2
江　差(47428)	6.6	-
浜　田(47755)	12.3	-

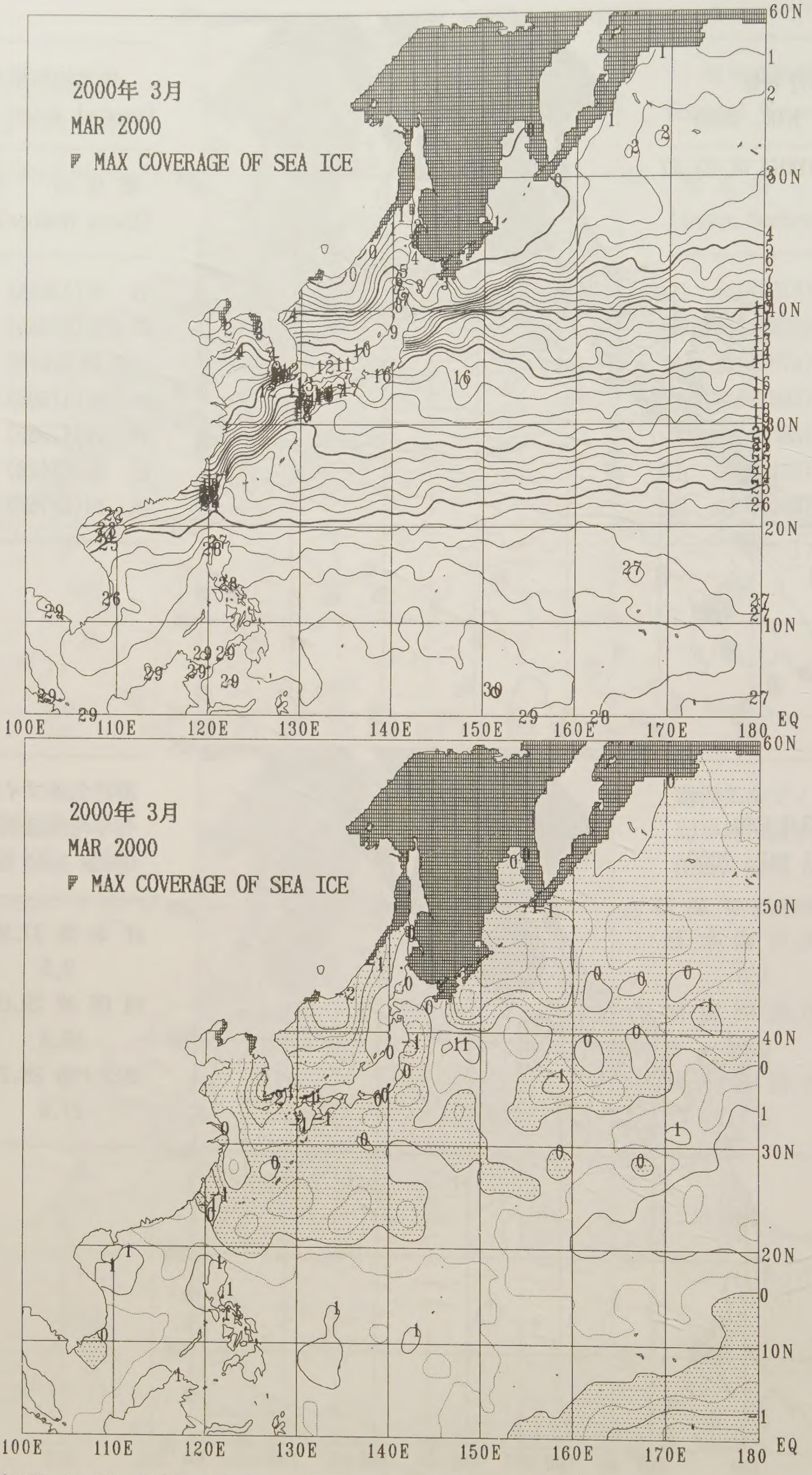


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日 本 海	37.9N,134.5E	9.5
四 国 沖	29.0N,135.0E	19.3
東シナ海	28.2N,126.3E	21.6

第3図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(2000年 3月下旬)

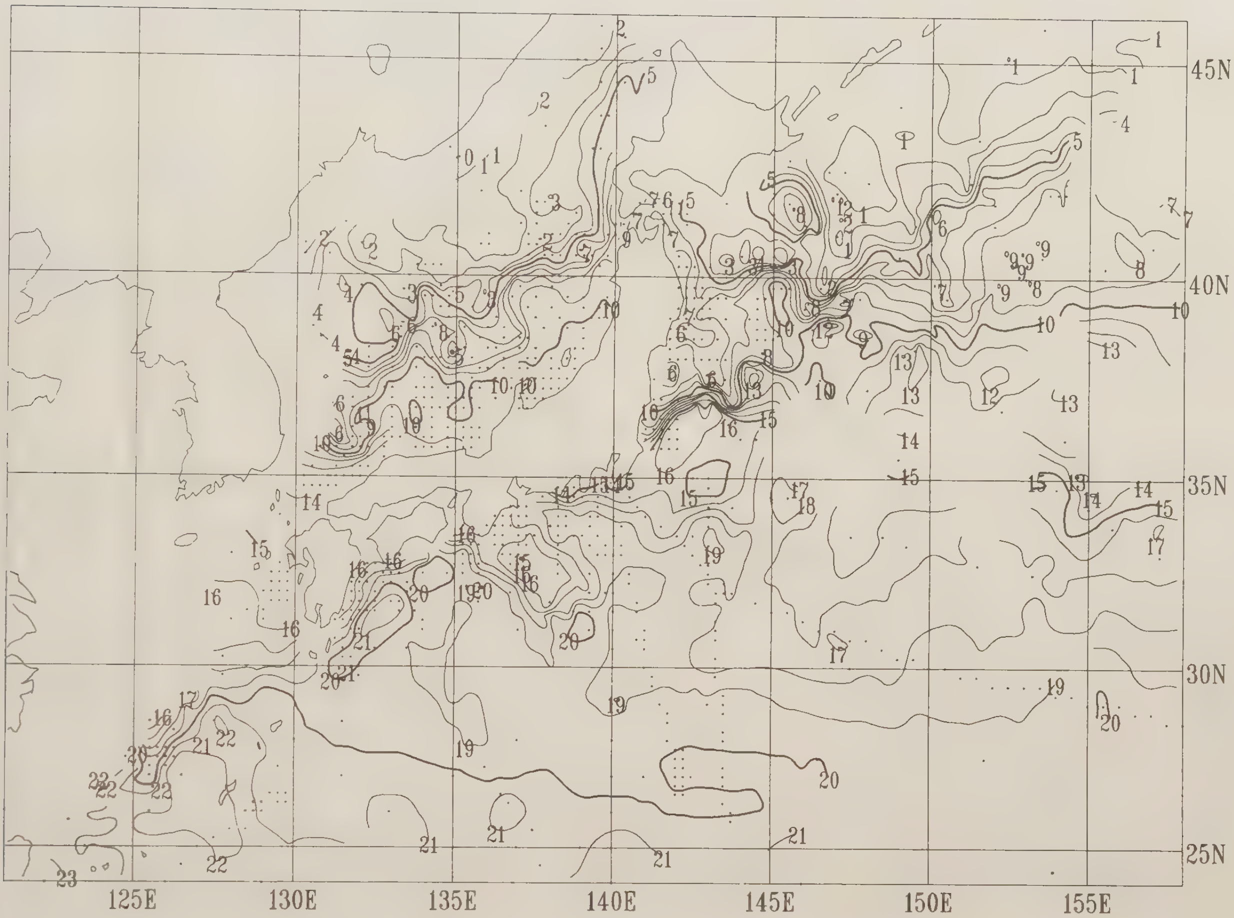
Fig.3 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 3rd ten-day period in MAR 2000. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



第4図 北西太平洋月平均海面水温図(上)及び偏差図(下)(2000年 3月)

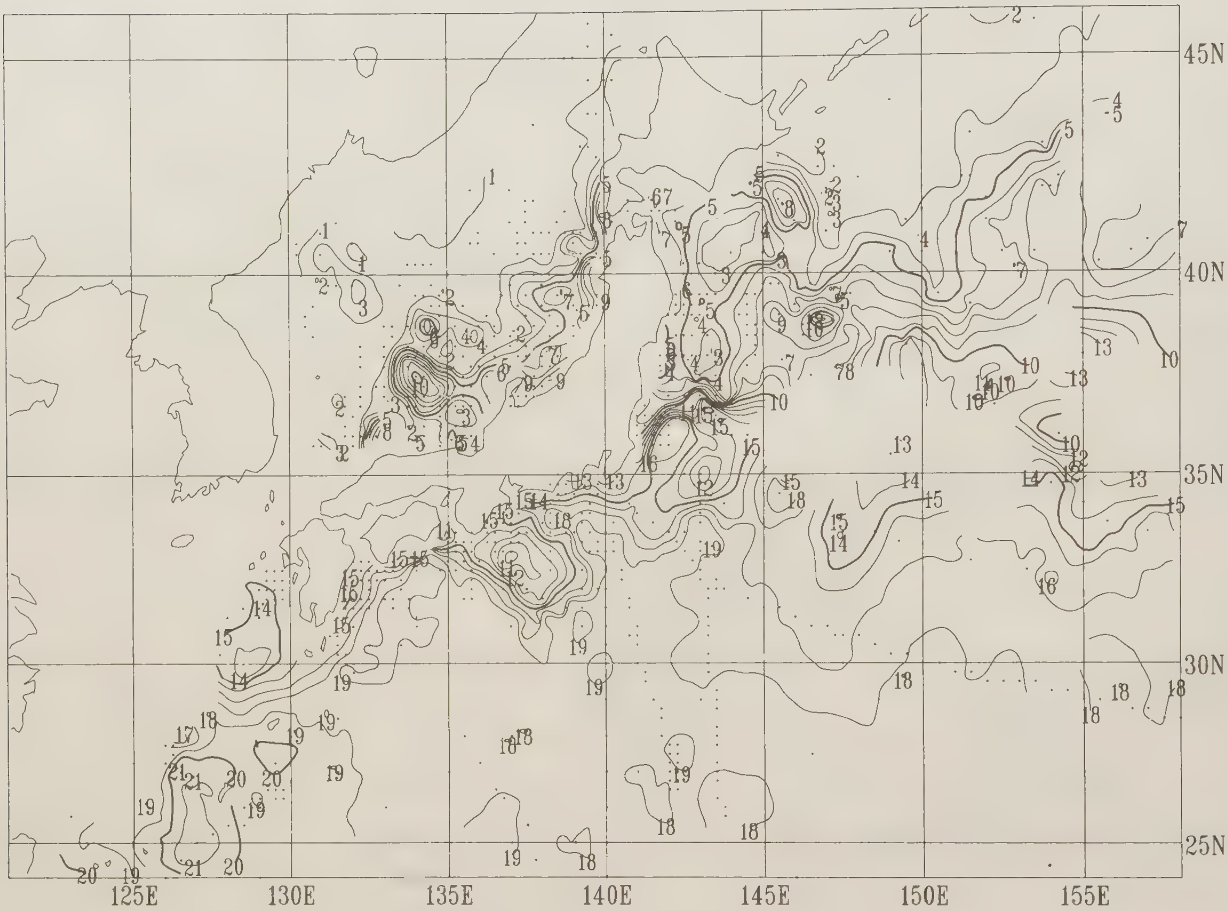
Fig.4 Monthly mean SST (top) and anomalies (bottom) in the western North Pacific for MAR 2000. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.

100m Temperatures in the Seas Adjacent to Japan



第5図　日本近海表層水温図(深さ100 m) (2000年 3月)

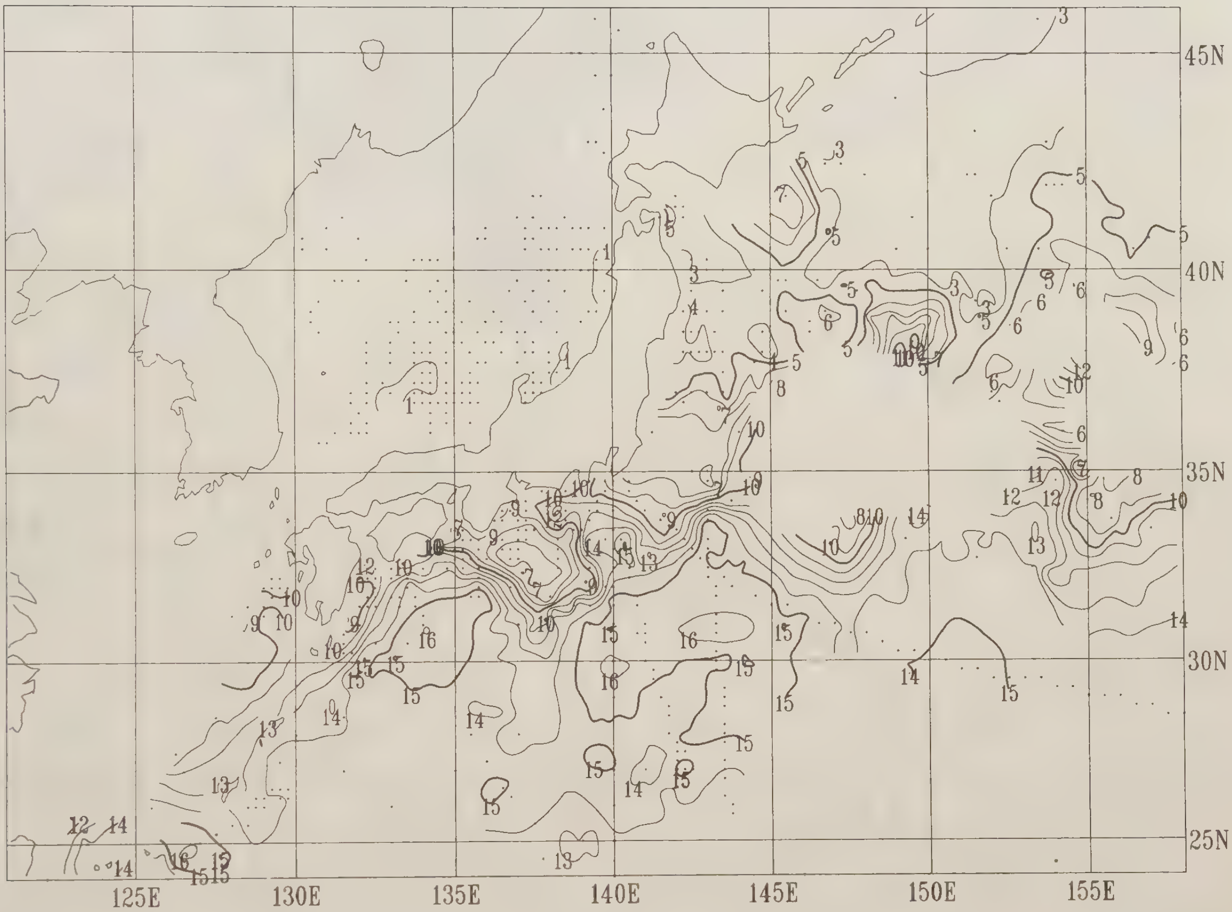
Fig.5 Subsurface (100 m) temperatures in the seas adjacent to Japan for MAR 2000. Contour interval is 1°C. Observation points are denoted by dots.



第6図　日本近海表層水温図(深さ200 m) (2000年 3月)

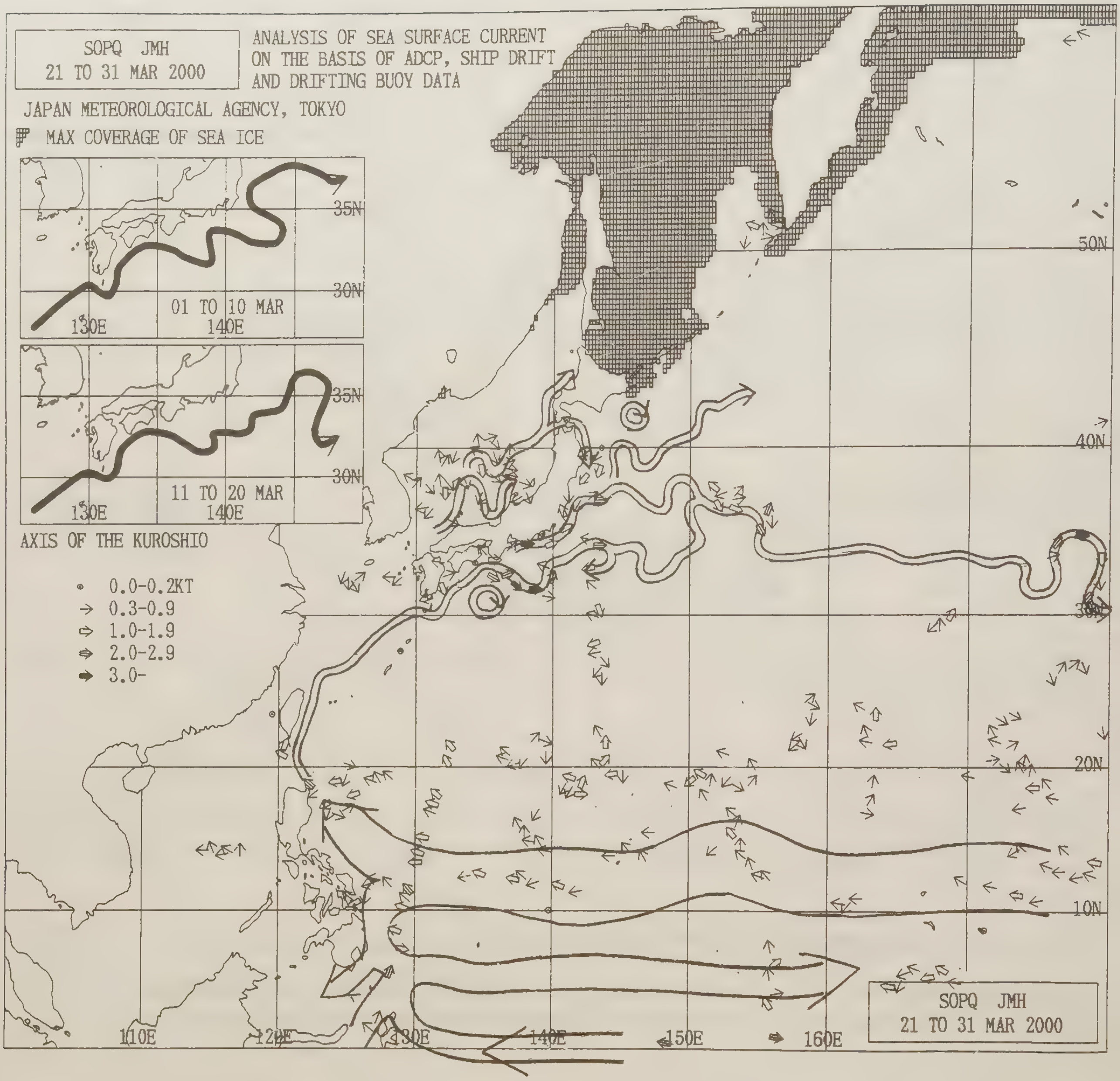
Fig.6 Subsurface (200 m) temperatures in the seas adjacent to Japan for MAR 2000. Contour interval is 1°C. Observation points are denoted by dots.

400m Temperatures in the Seas Adjacent to Japan



第7図　日本近海表層水温図(深さ400 m) (2000年 3月)

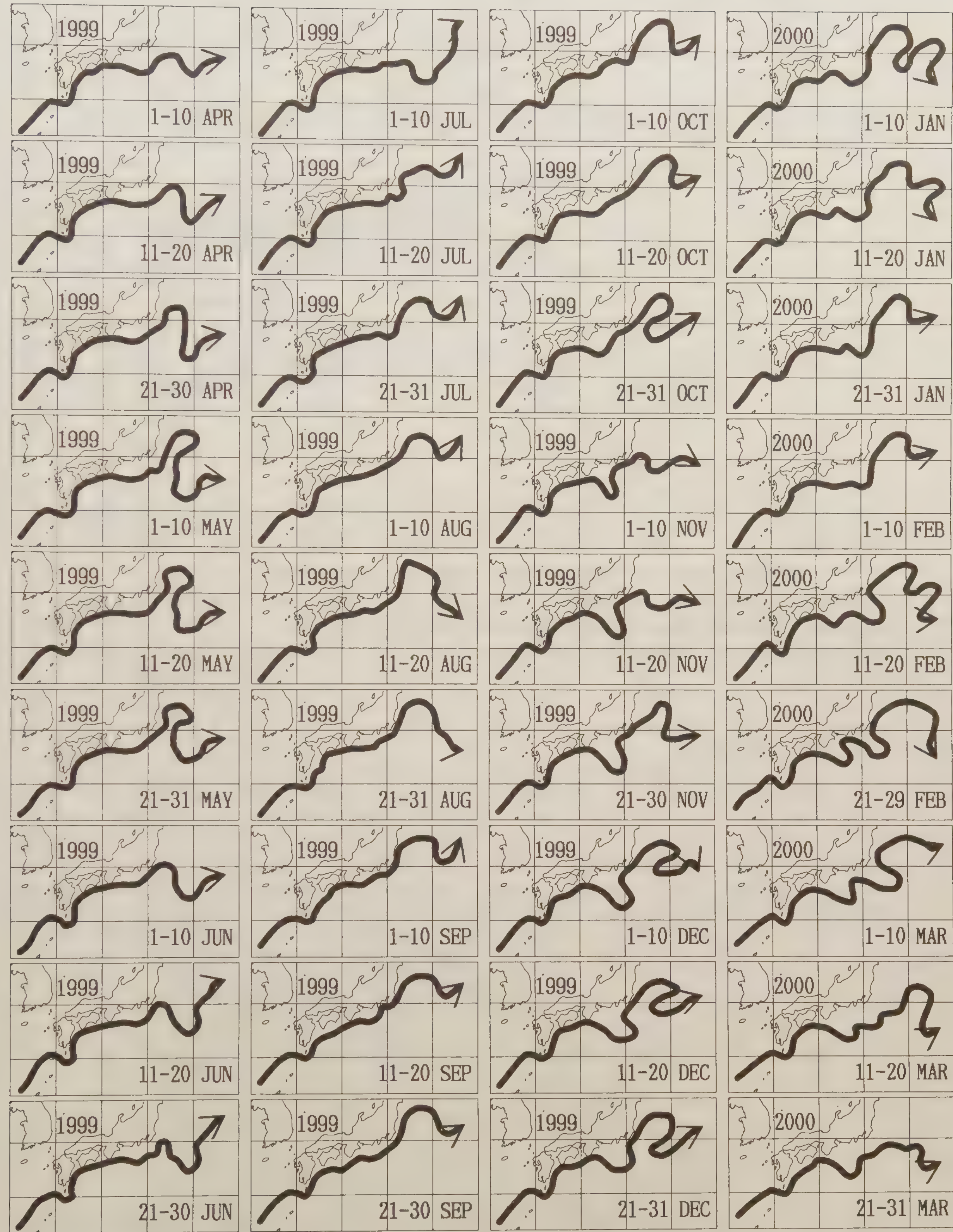
Fig.7 Subsurface (400 m) temperatures in the seas adjacent to Japan for MAR 2000. Contour interval is 1°C. Observation points are denoted by dots.



第 8 図　北西太平洋海流図（2000 年 3 月下旬）

Fig. 8　Analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in March 2000. Small arrows indicate *in situ* observations. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.

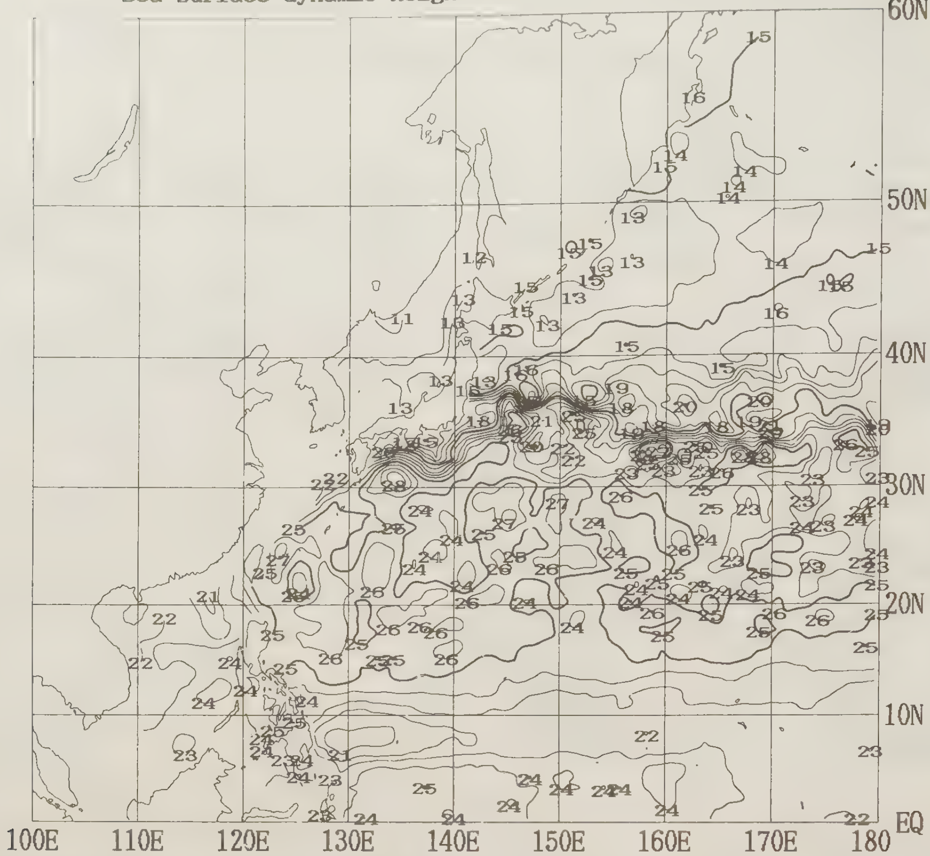
Location of the Kuroshio axis



第9図 旬別黒潮流軸図

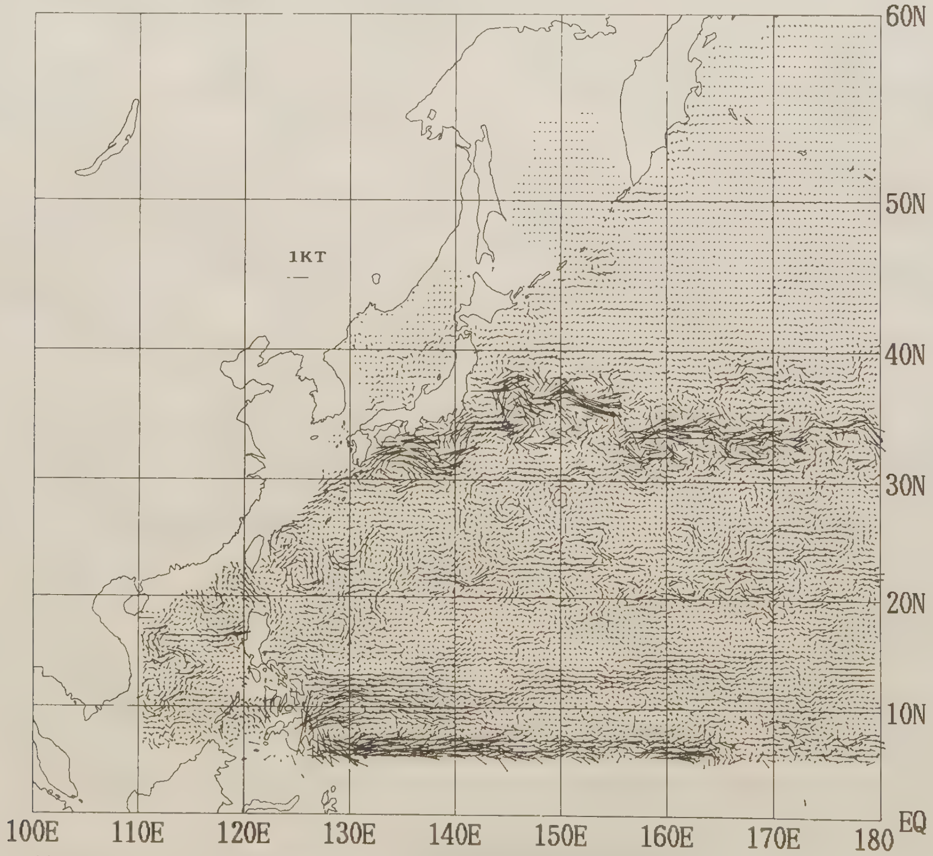
Fig.9 Location of the Kuroshio axis

Sea surface dynamic heights and current distribution



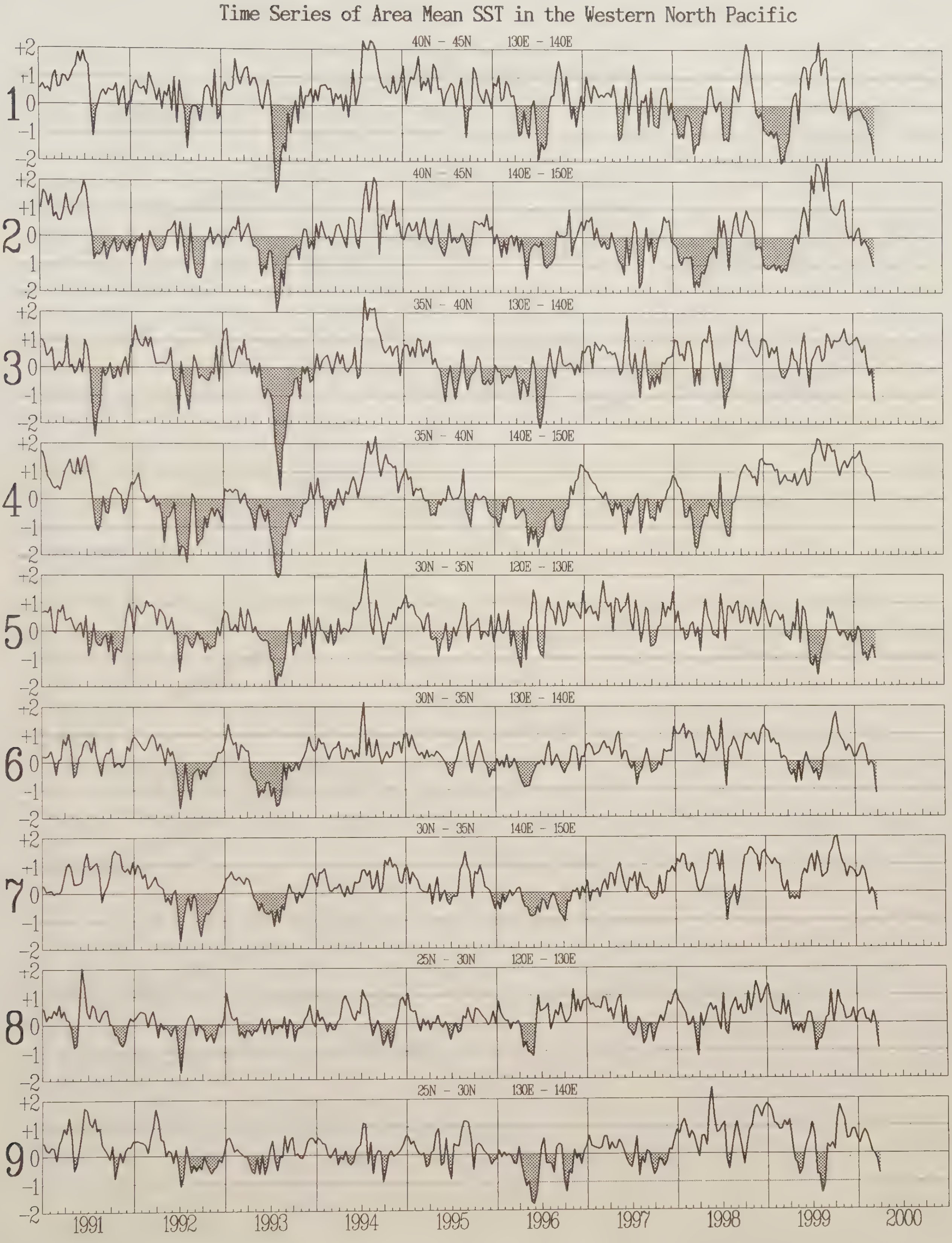
第10図 北西太平洋力学的海面高度分布図(2000年 3月26日)

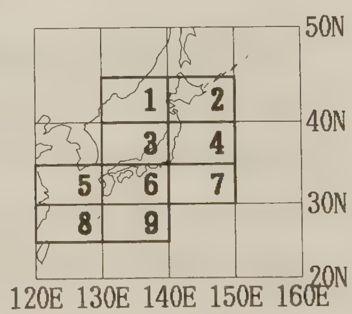
Fig.10 Sea surface dynamic heights (10 cm) in the western North Pacific derived from the altimeter data of TOPEX/POSEIDON (MAR 26, 2000).
1500 db surface is assumed to be the surface of no motion.



第11図 北西太平洋海流ベクトル図(2000年 3月26日)

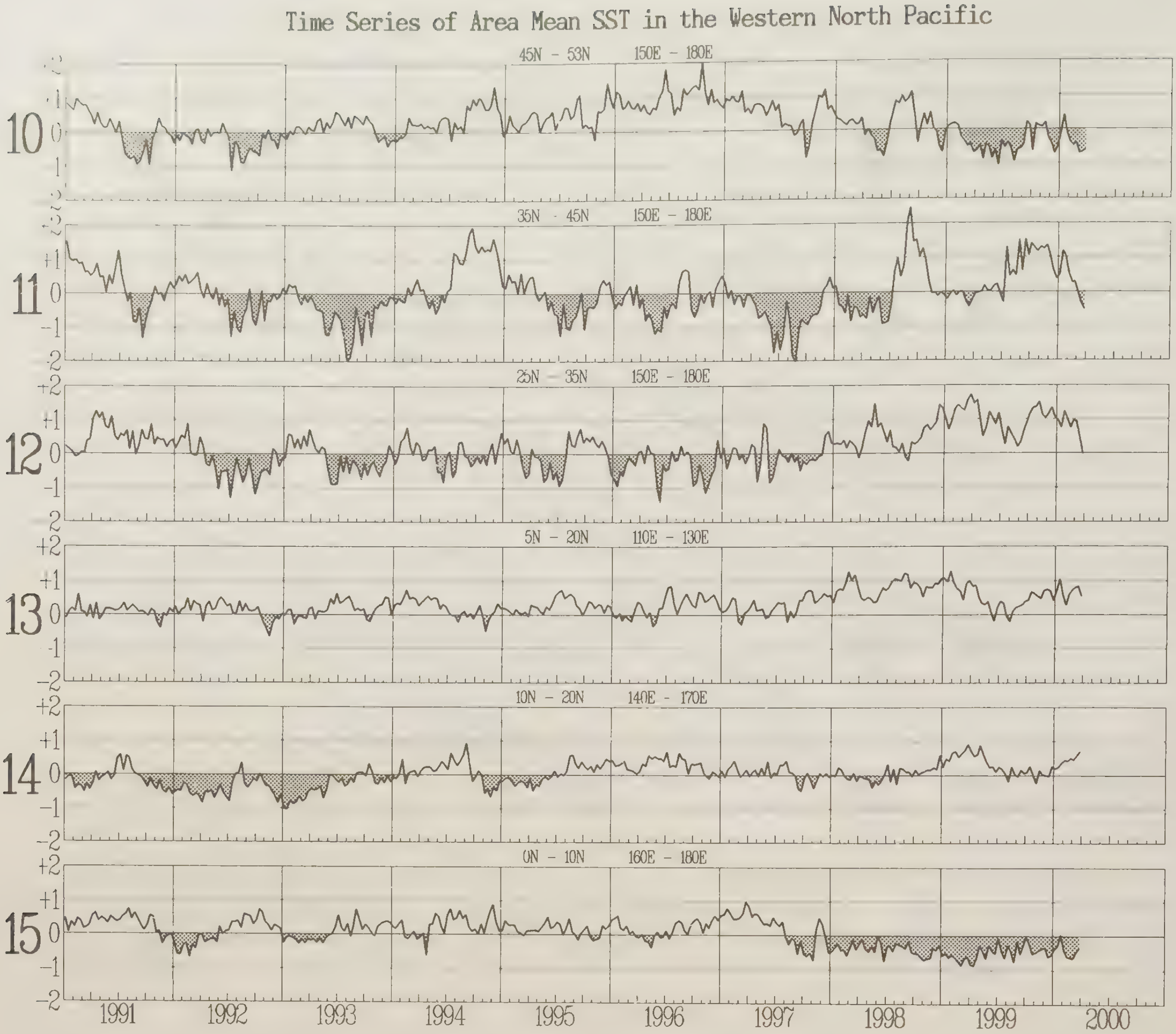
Fig.11 Sea surface current vectors in the western North Pacific (MAR 26, 2000). Vectors are derived from the sea surface dynamic heights from TOPEX/POSEIDON and subsurface temperature distribution assuming the geostrophic relation.

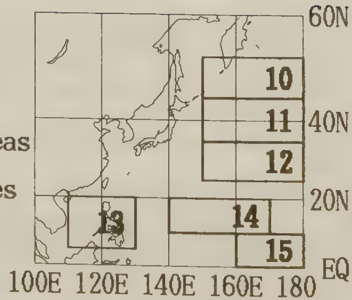




第12図　海域別旬平均海面水温平年偏差時系列図

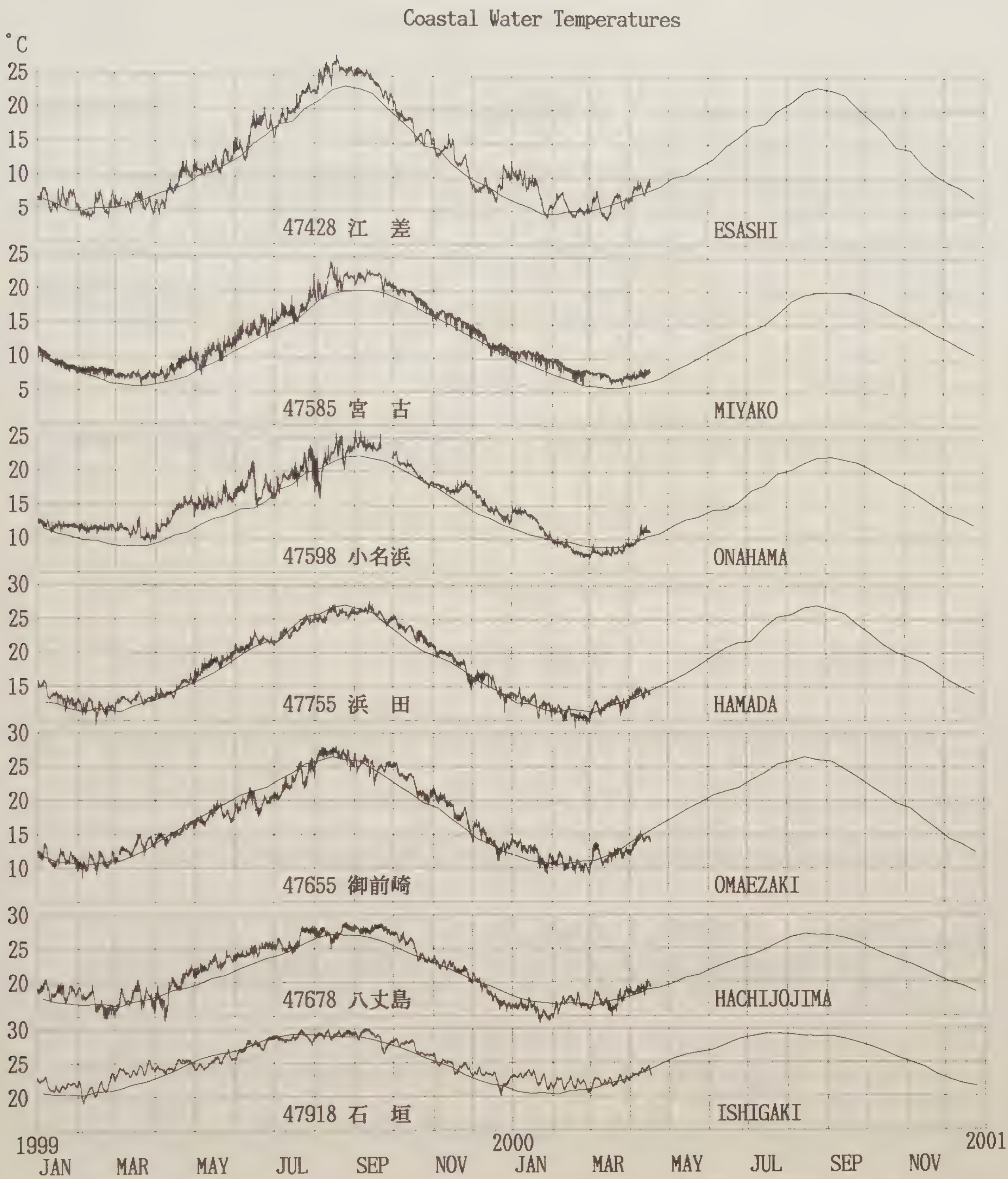
Fig.12 Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).

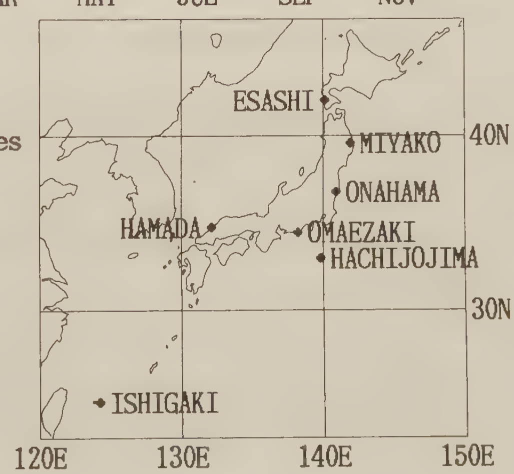




第12図　海域別旬平均海面水温平年偏差時系列図（つづき）

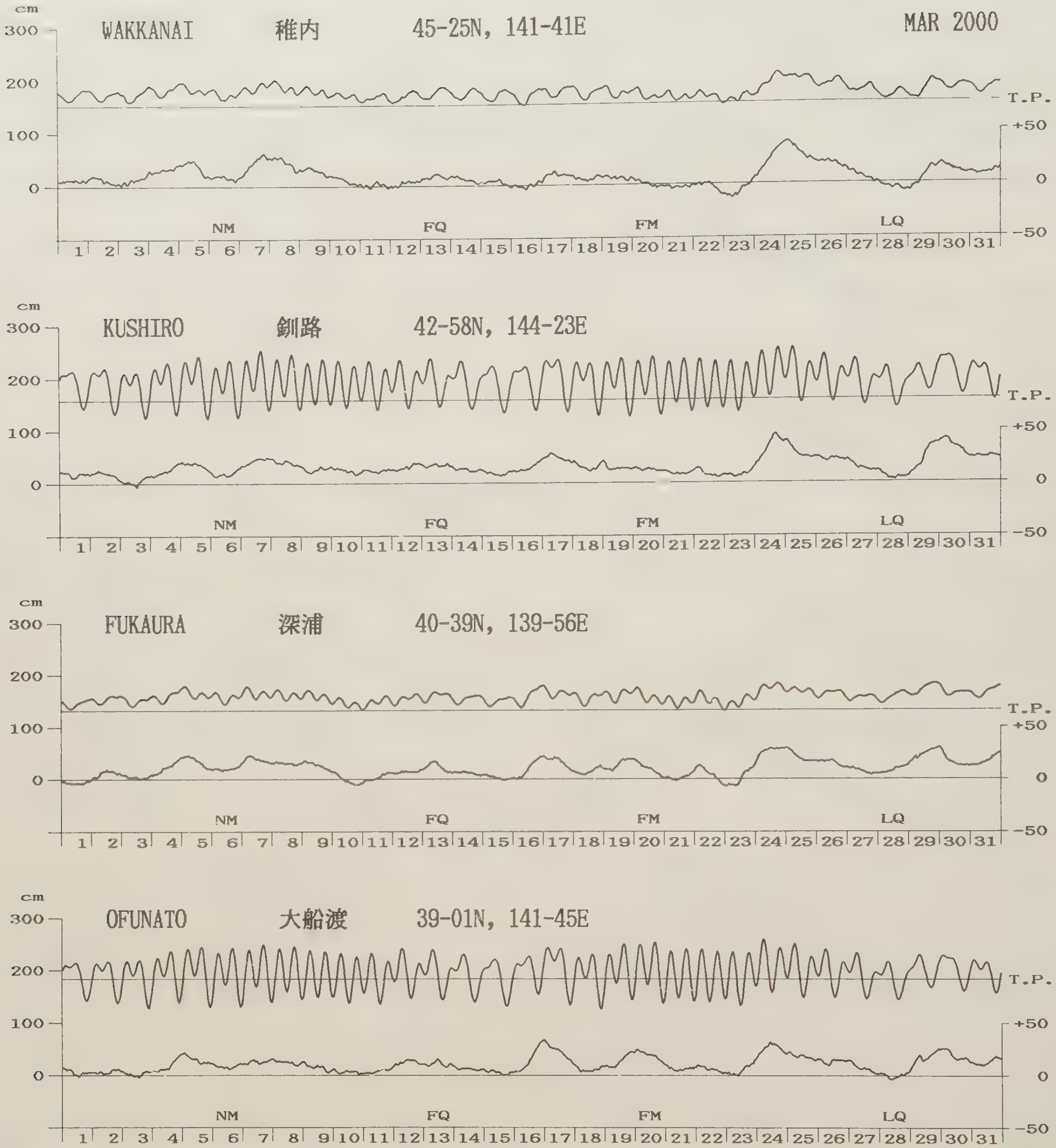
Fig.12 (continue) Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).





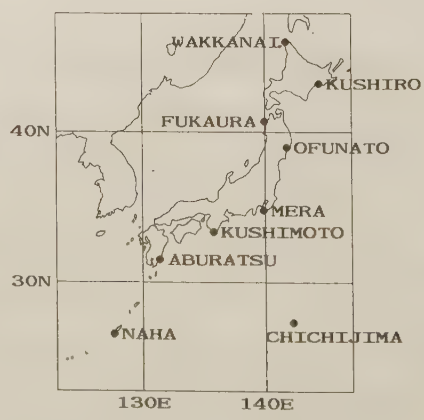
第13図 沿岸水温時系列図

Fig.13 Time series of hourly coastal water temperatures (˚C) measured at 7 coastal stations of the JMA shown in the right panel.
Thin lines show ten-day mean climatology.

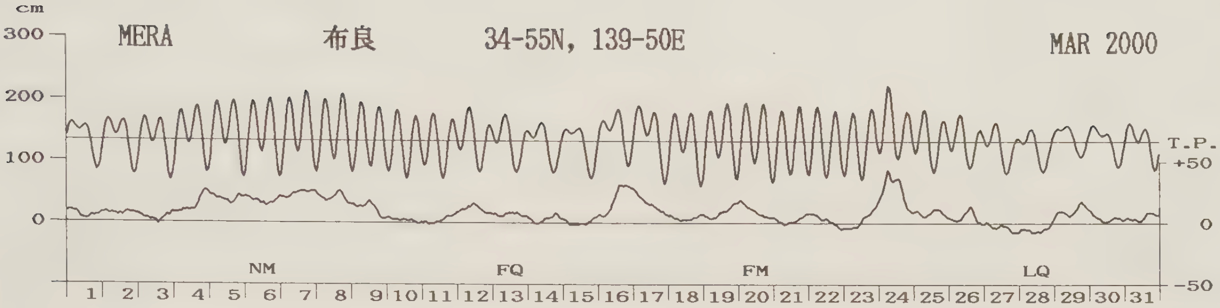


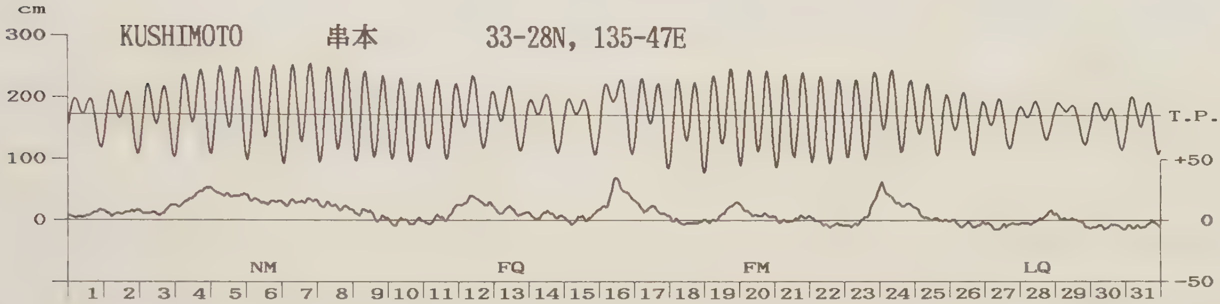
第14図 沿岸潮位時系列図 (2000年 3月)

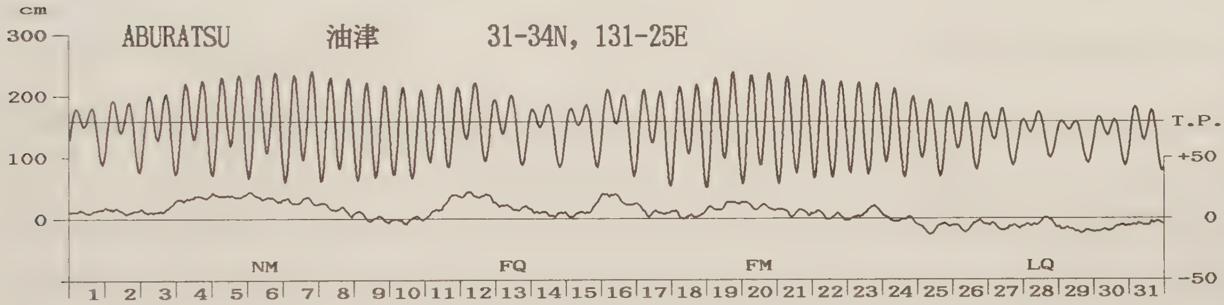
Fig.14 Time series of hourly sea level observation (upper line) and its anomalies (lower line) at 9 stations of the JMA in the right panel.
Short term variations are removed from raw data.

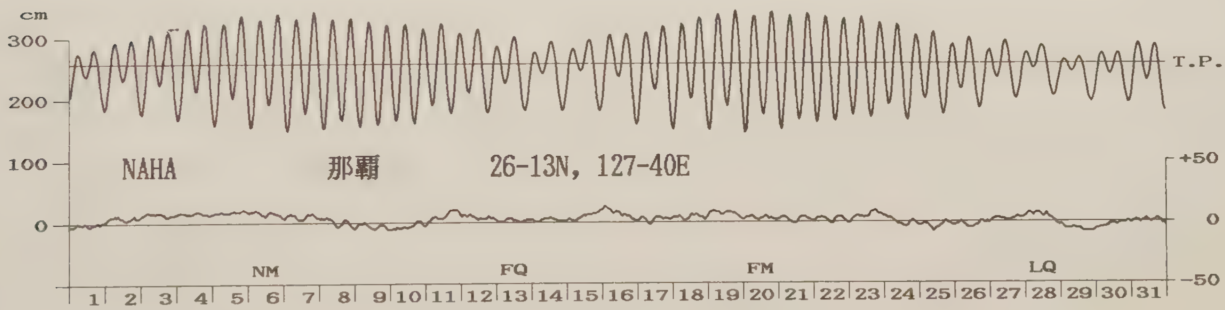


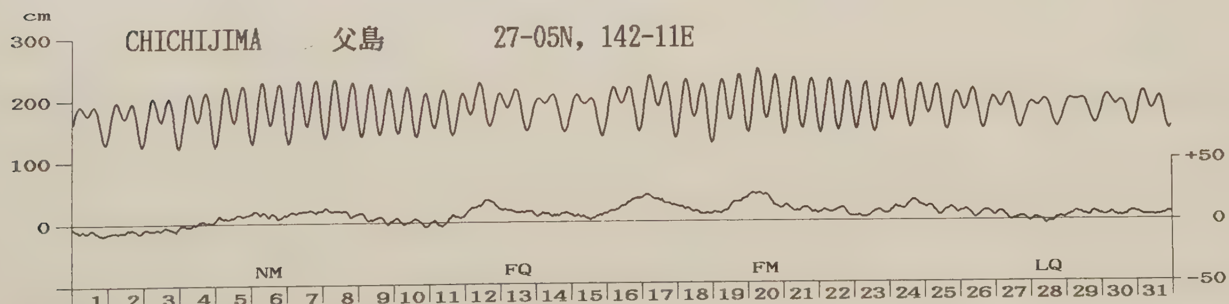
NM: new moon, FQ: first quarter
FM: full moon, LQ: last quarter
T.P.: Mean sea level of Tokyo Bay (Tokyo Peil)



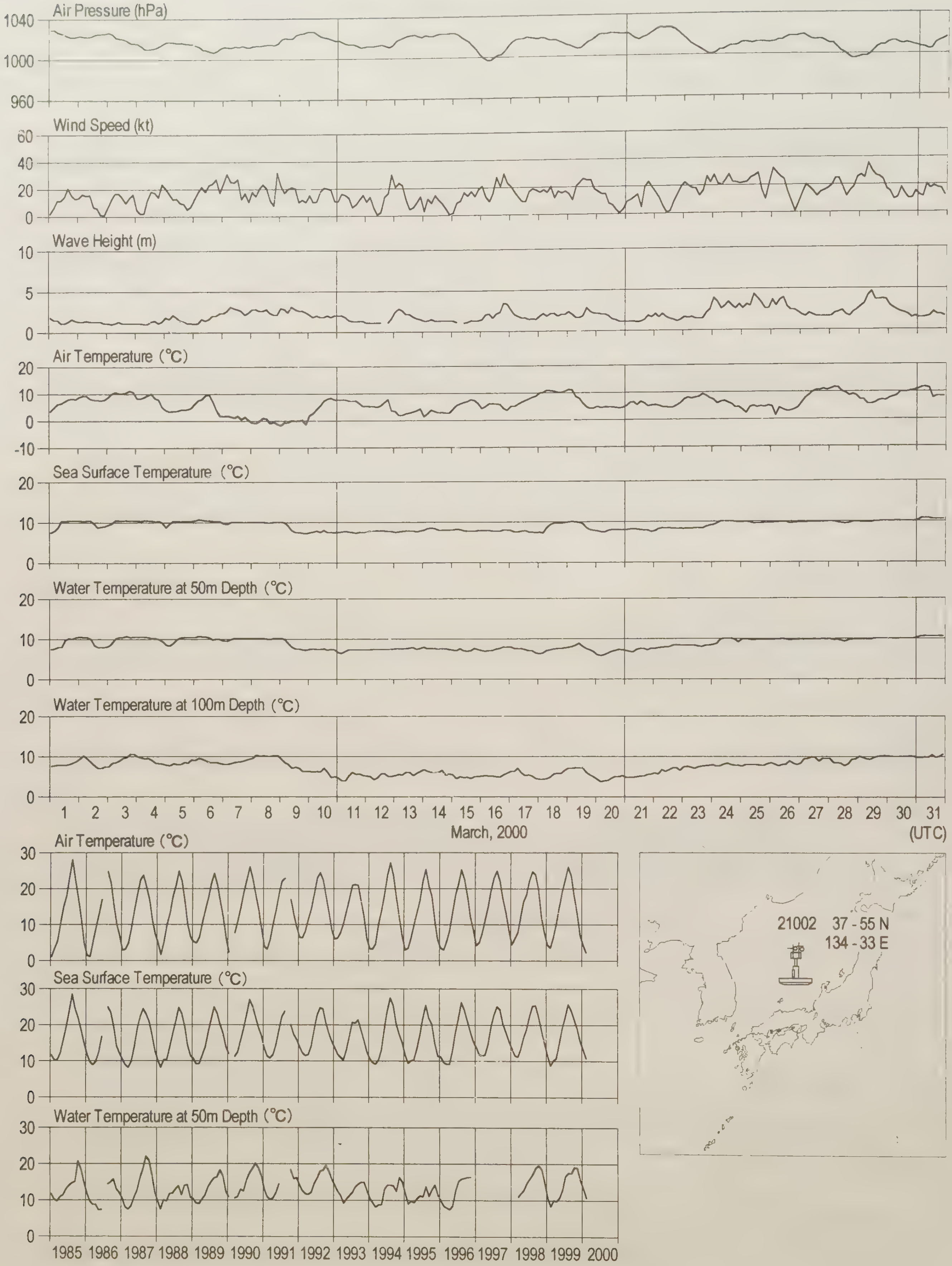








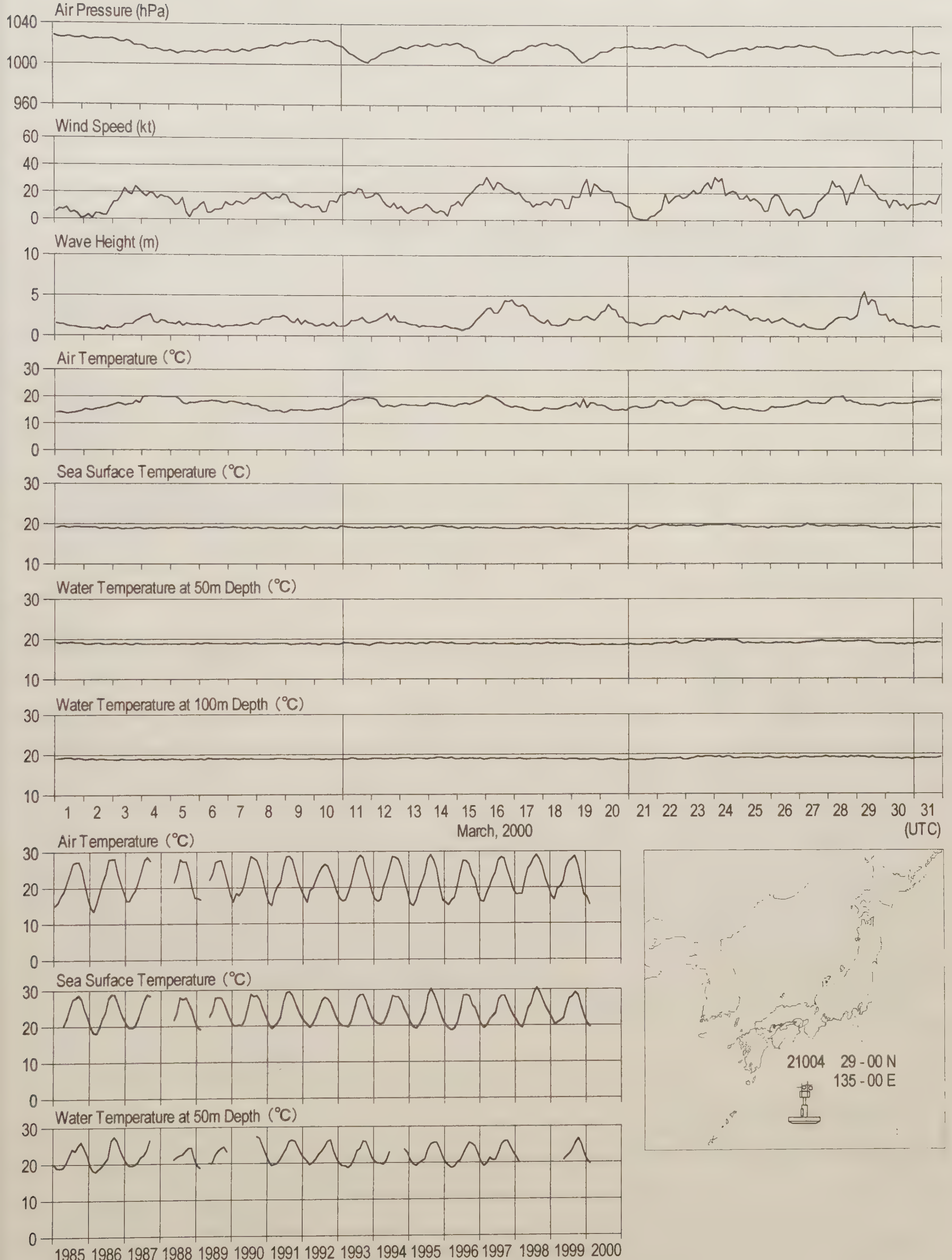
第14図 つづき
Fig.14 continue



第15図　海洋気象ブイロボットによる観測要素の時系列図（日本海：21002)
上段は３時間毎の観測値を、下段は月平均値を示す。

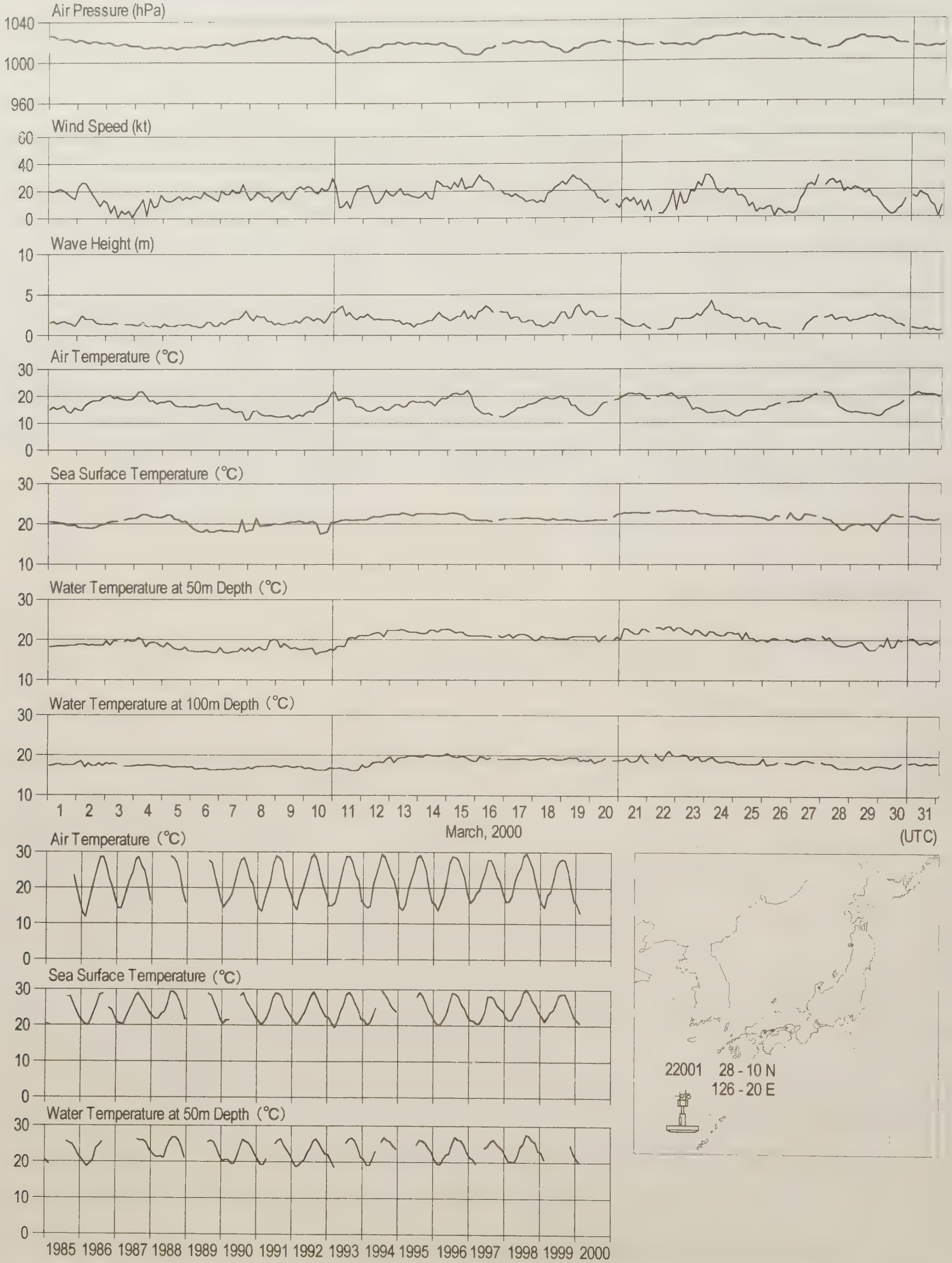
Fig.15　Time series of JMA buoy observation in the Japan Sea (WMO ID No. 21002).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.

Ocean Data Buoy Observations



第15図　海洋気象ブイロボットによる観測要素の時系列図（四国沖：21004）
上段は３時間毎の観測値を、下段は月平均値を示す。

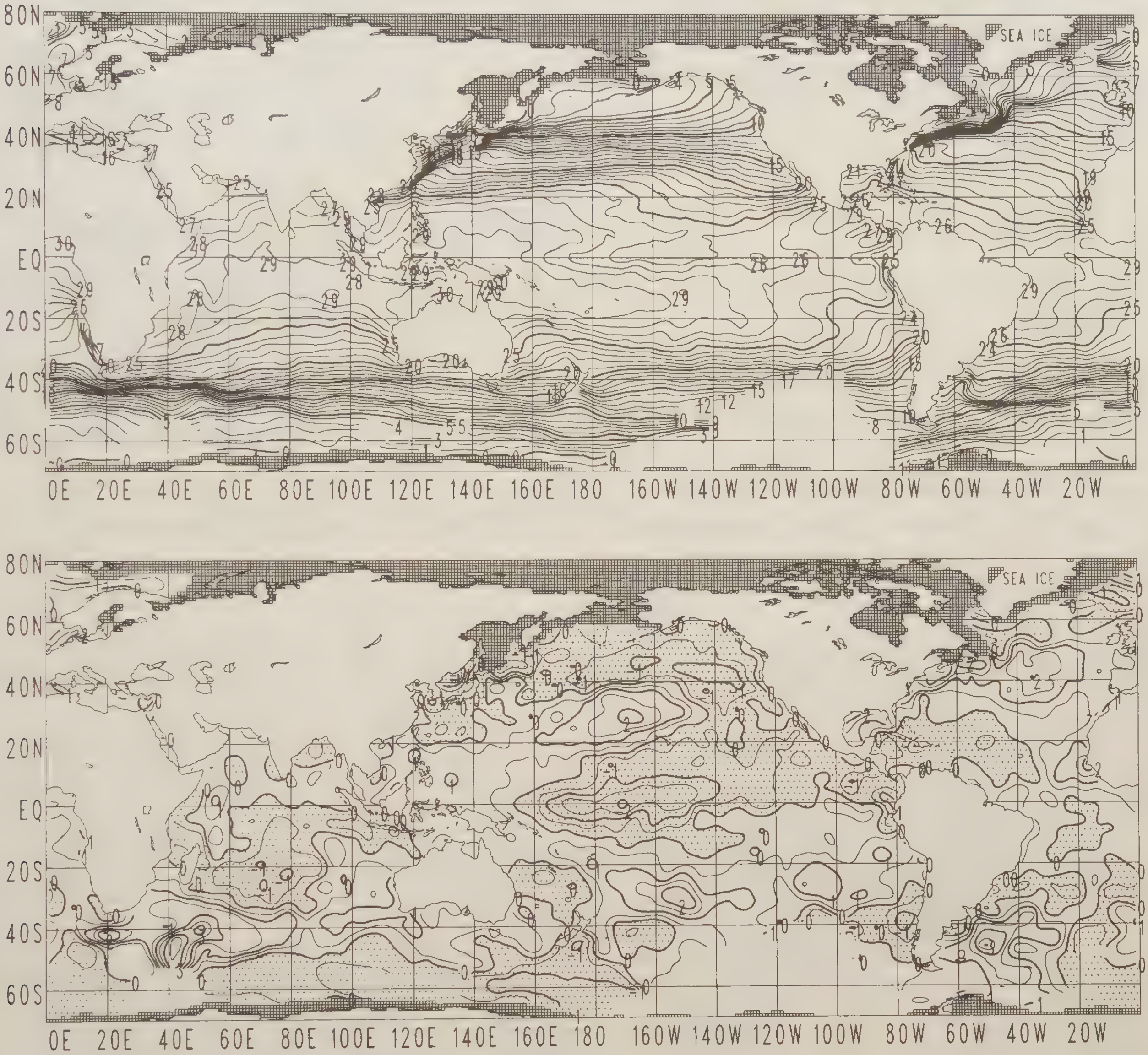
Fig.15　Time series of JMA buoy observation south of Shikoku (WMO ID No. 21004).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



第15図　海洋気象ブイロボットによる観測要素の時系列図（東シナ海：22001）
上段は３時間毎の観測値を、下段は月平均値を示す。

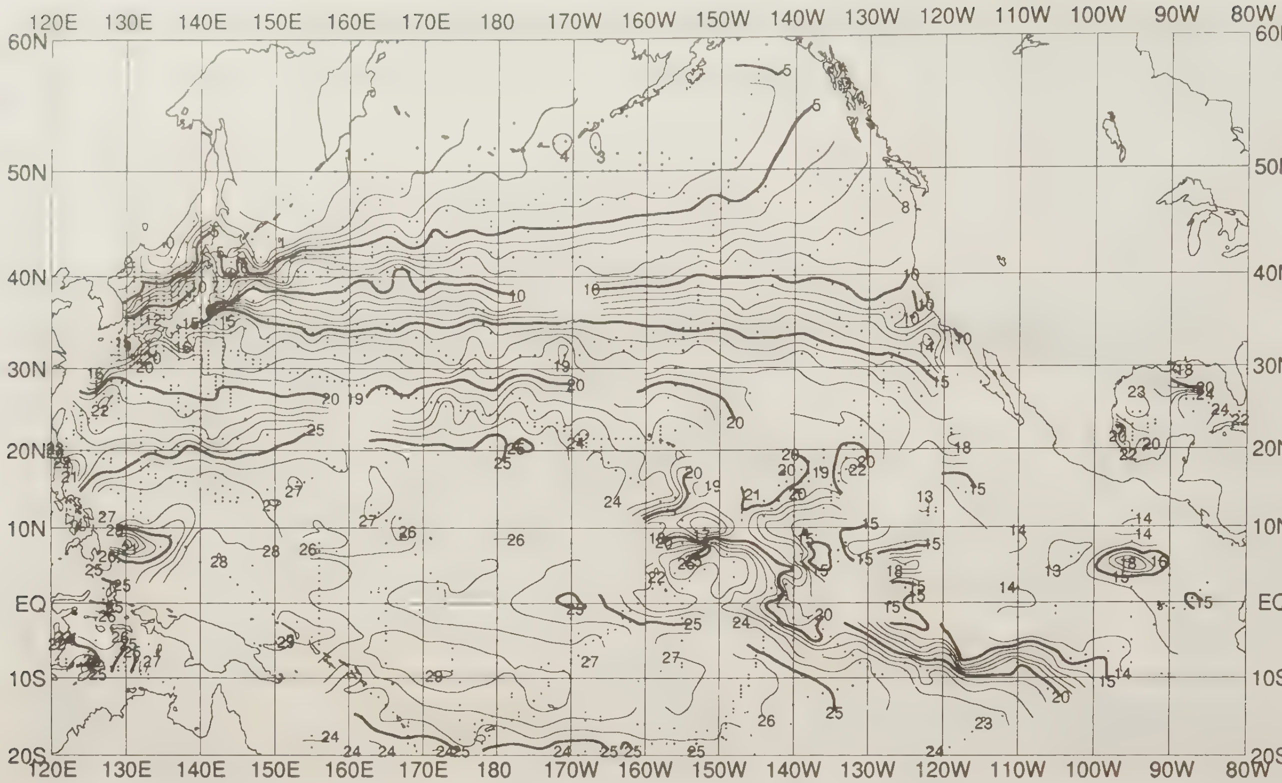
Fig.15　Time series of JMA buoy observation in the East China Sea (WMO ID No. 22001).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.

SST & Anomalies in the Global Ocean



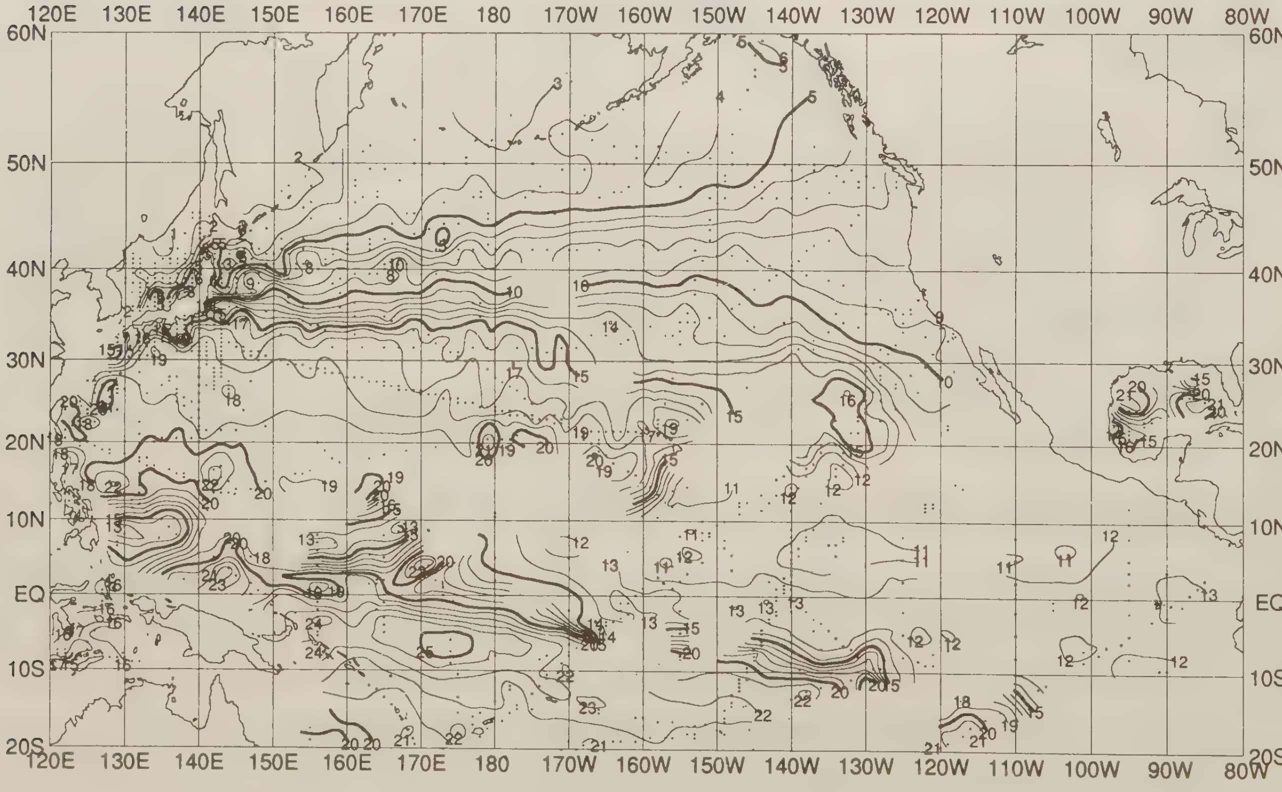
第16図　全球月平均海面水温図（上）及び偏差図（下）（2000年 3月）

Fig.16 Monthly mean sea surface temperature over the global ocean (top) and anomalies (bottom) for MAR 2000. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C (top) and additional anomaly contours of ±0.5°C are shown by thin lines. Negative anomalies are spotted. Maximum coverage of sea ice is shaded. Data sources for sea ice are U.S. National Ice Center (polar regions) and JMA (the Sea of Okhotsk).



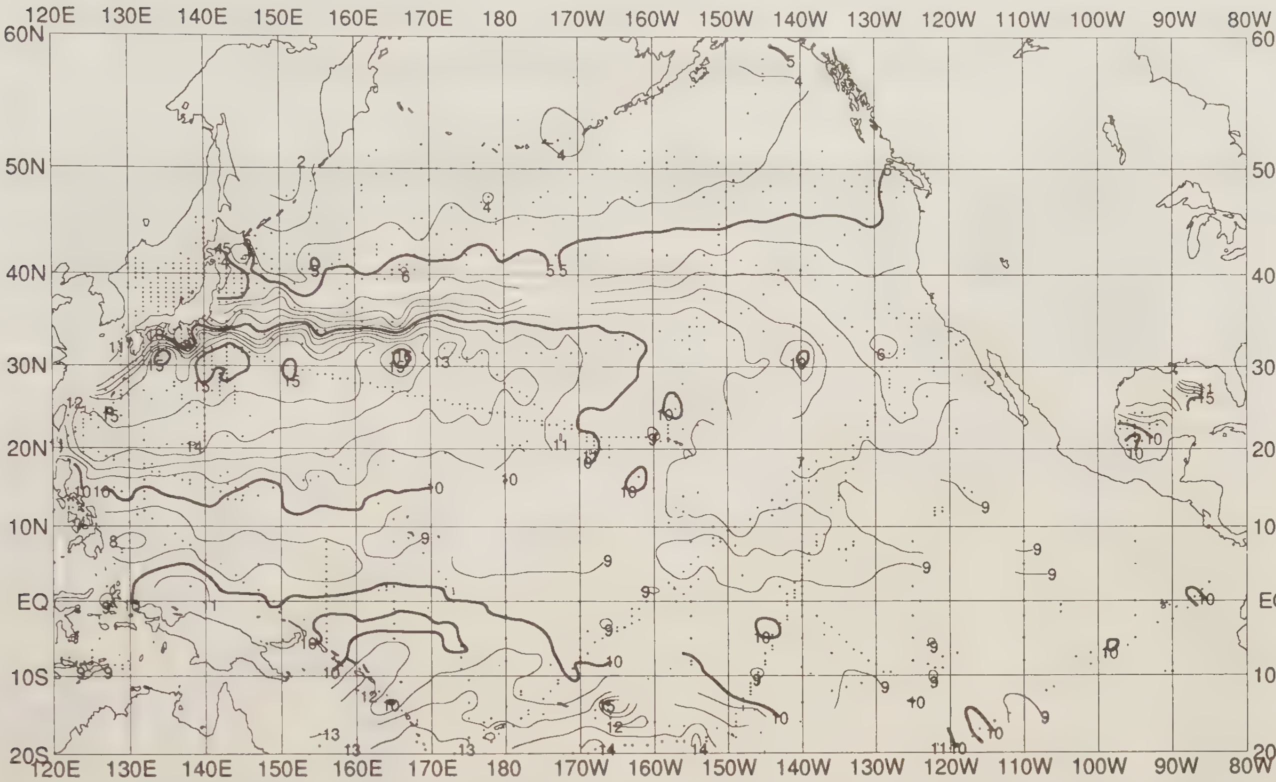
第 17 図　太平洋表層水温図（深さ 100 m）（2000 年 3 月）

Fig. 17　Subsurface (100 m) temperatures in the Pacific Ocean for March 2000. Contour interval is 1 ℃. Observation points are denoted by dots.



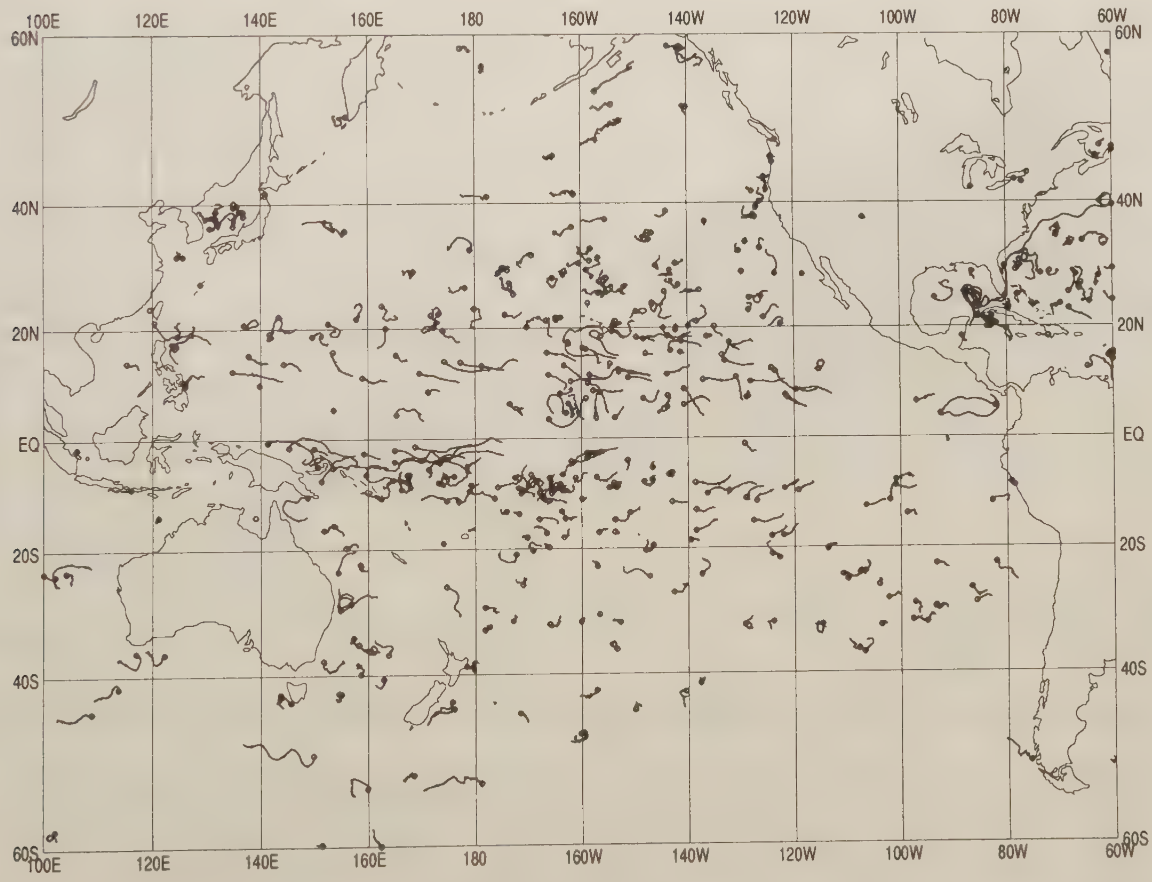
第 18 図　太平洋表層水温図（深さ 200 m）（2000 年 3 月）

Fig. 18　Subsurface (200 m) temperatures in the Pacific Ocean for March 2000. Contour interval is 1 ℃. Observation points are denoted by dots.



第 19 図　太平洋表層水温図（深さ 400 m）（2000 年 3 月）

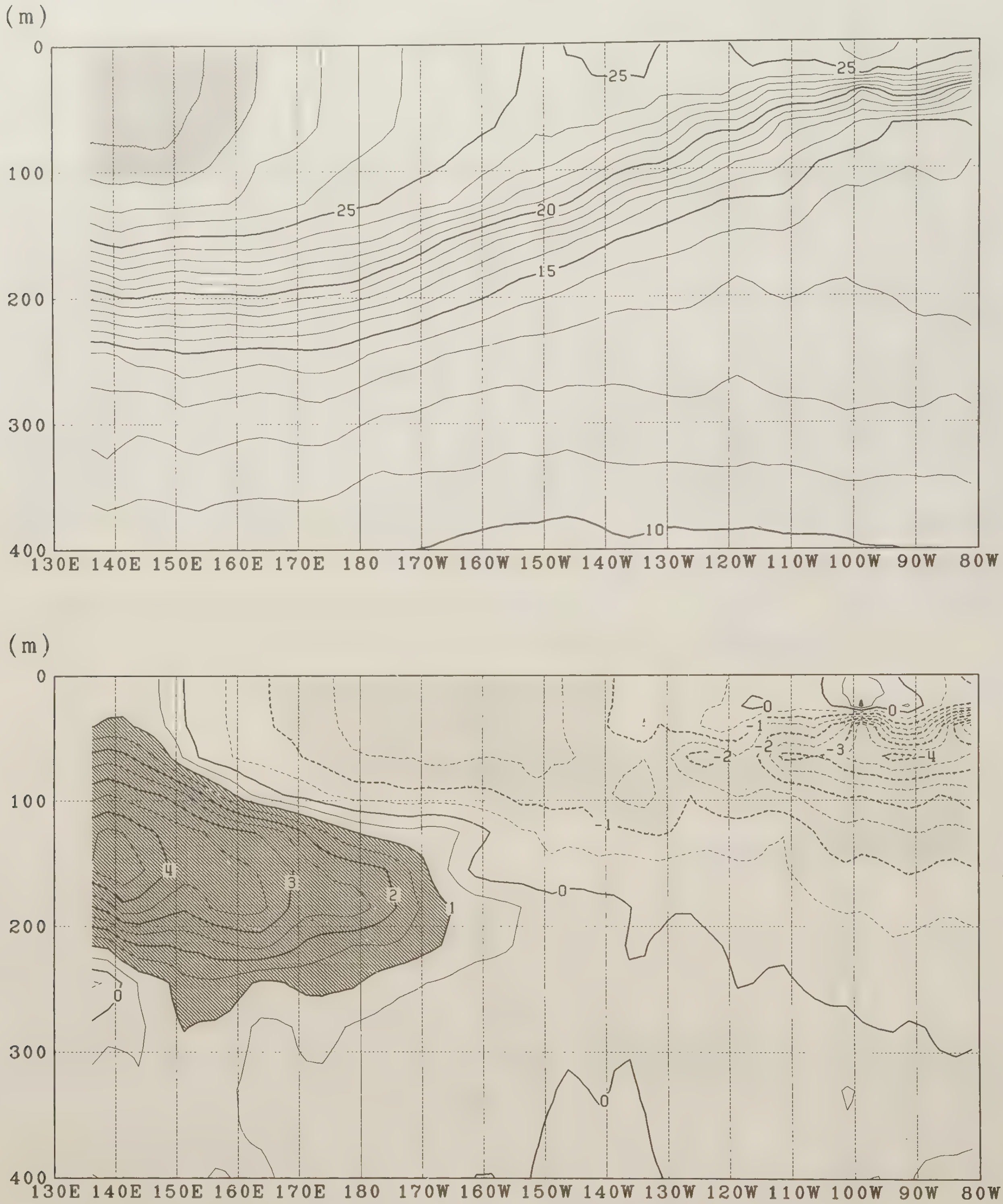
Fig. 19　Subsurface (400 m) temperatures in the Pacific Ocean for March 2000. Contour interval is 1 ℃. Observation points are denoted by dots.



第 20 図　太平洋ブイ流跡図（2000 年 3 月）

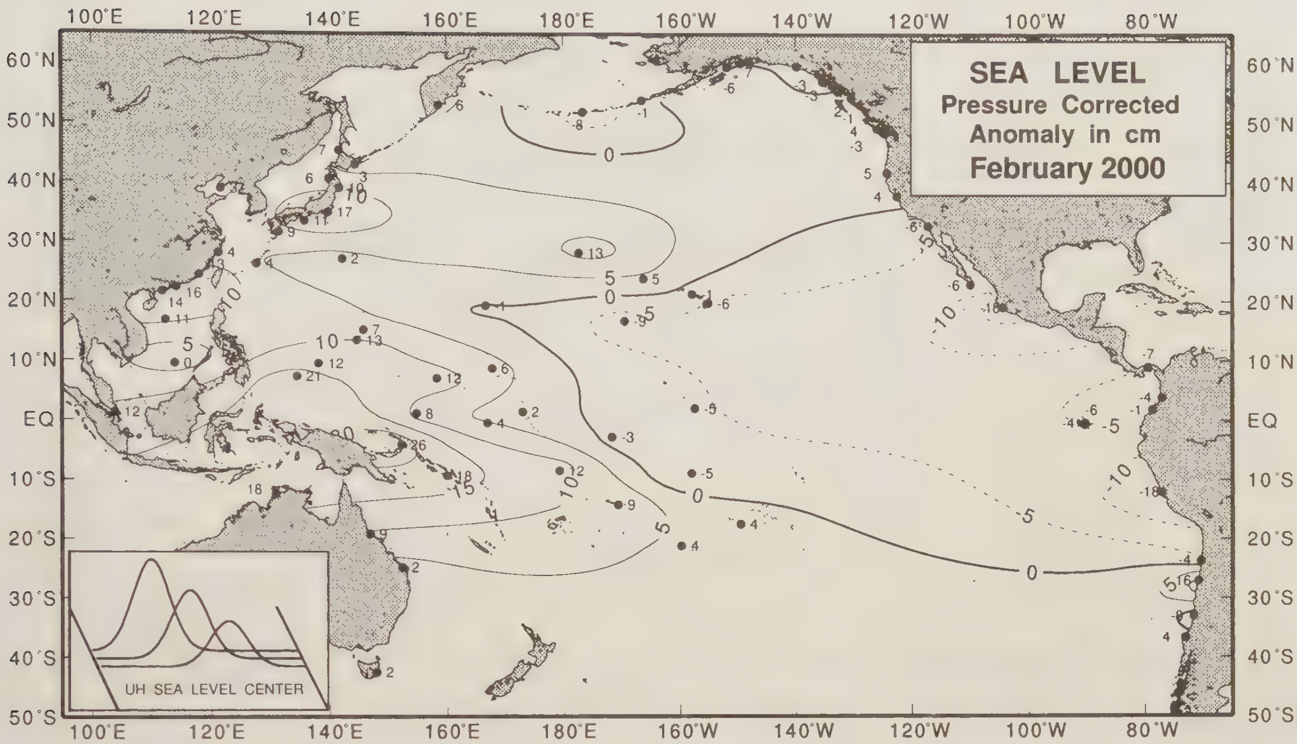
Fig. 20　Movements of drifting buoys in the Pacific Ocean during March 2000. Each track is for one buoy. Small circles represent the last positions for the month.

Depth-Longitude Sections of Equatorial Temperature & Anomalies



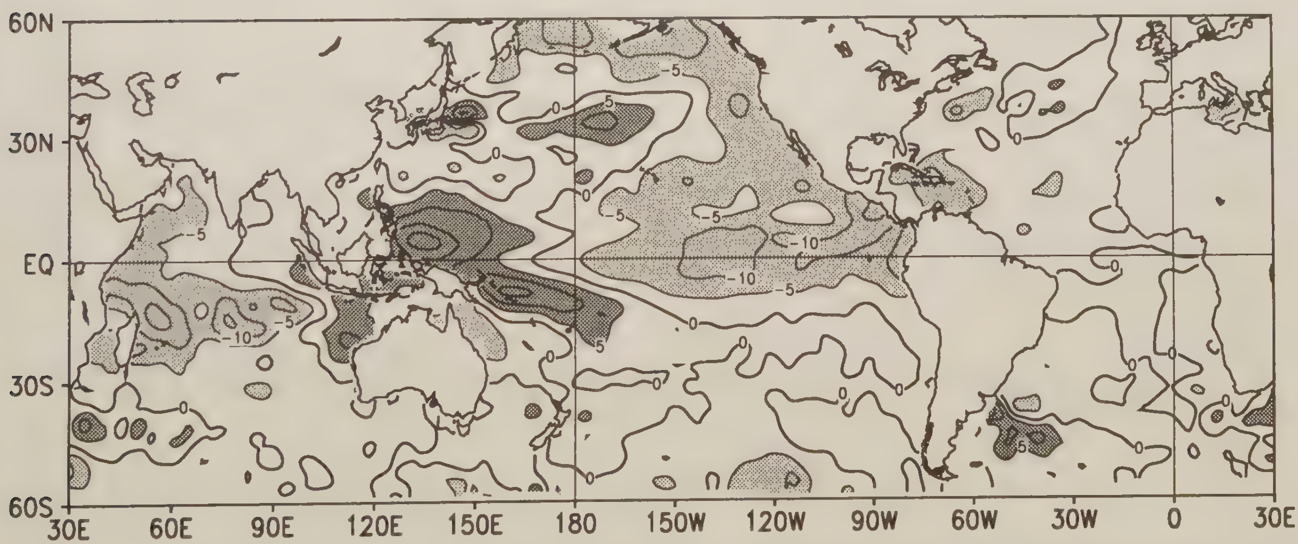
第21図　太平洋赤道に沿う表層水温（上）及び偏差（下）の深度－経度断面図（2000年 3月）

Fig.21 Depth-longitude sections of temperature (top) and anomalies (bottom) along the equator in the Pacific Ocean for MAR 2000. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (top) and 0.5°C (bottom). Values greater than 28°C in the top panel are shaded. In the bottom panel, values greater than 1°C are shaded and values less than -1°C are spotted. Anomalies are computed from 1987-1998 base period means.



第 22 図　太平洋月平均海面水位偏差図（2000 年 2 月）

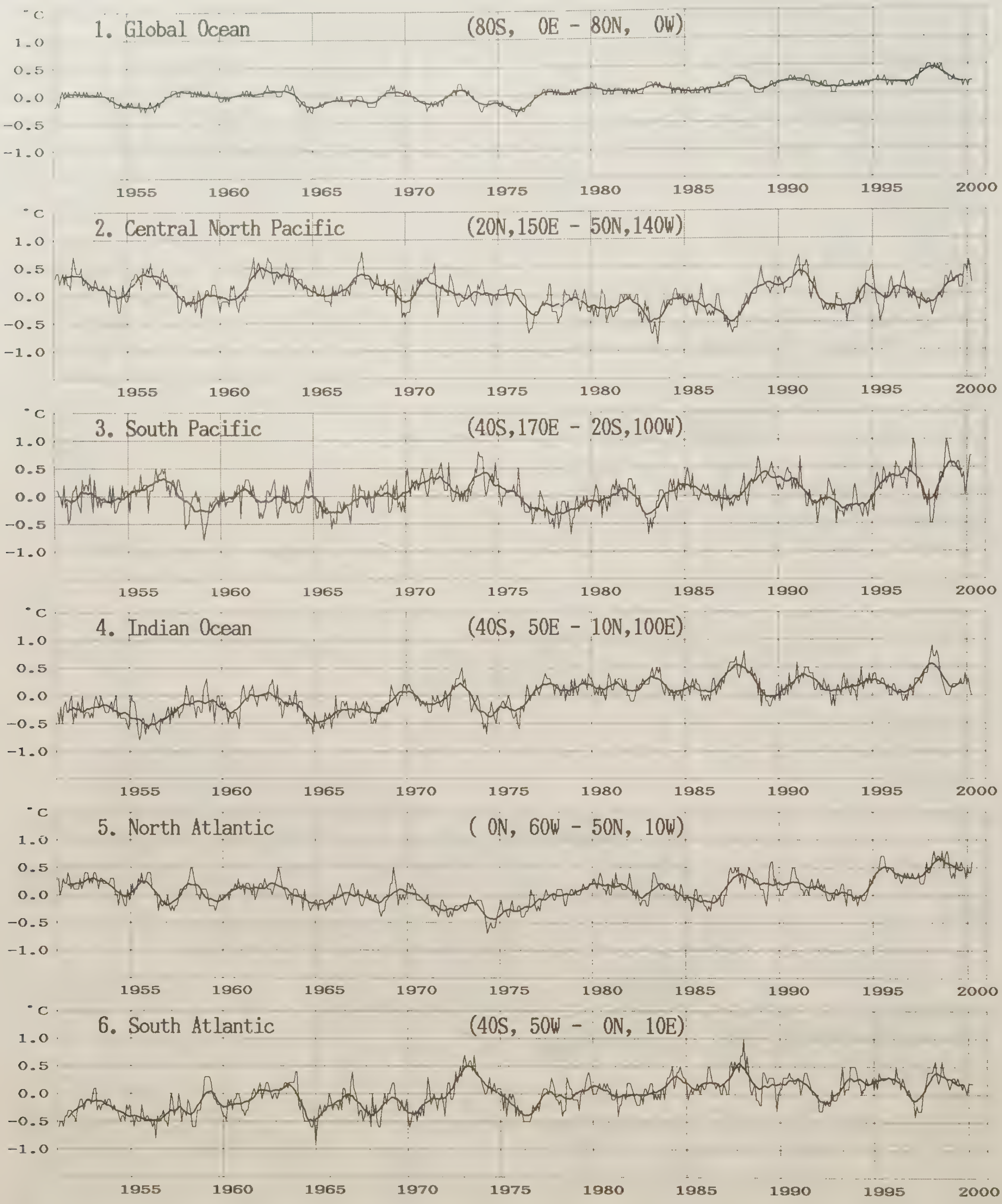
Fig. 22　Monthly sea level anomalies for February 2000 obtained from mean sea level (1975-1995) adjusted for atmospheric pressure. This figure is prepared by the SOC of ISLP-PAC, Department of Oceanography, University of Hawaii.



第 23 図　全球月平均海面高度偏差図（2000 年 2 月）

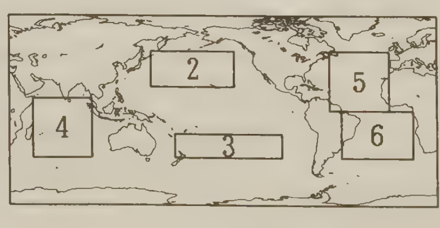
Fig. 23　Monthly sea surface height anomalies in the global ocean derived from the altimeter data of TOPEX/POSEIDON for February 2000. Contour interval is 5 cm. Positive anomalies exceeding +5 cm are shaded and negative anomalies exceeding -5 cm are spotted. Anomalies are computed from 1993-1998 base period means.

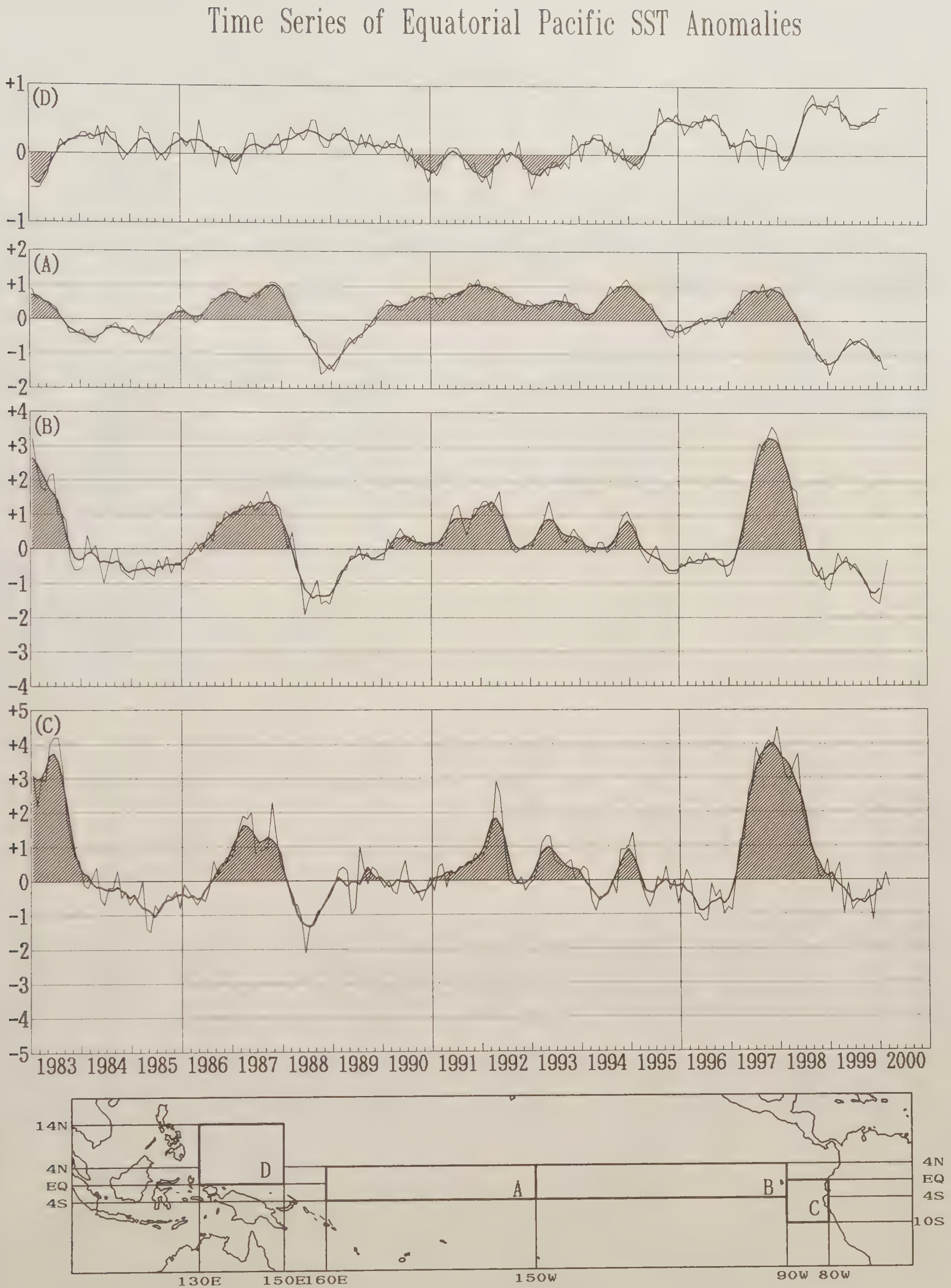
Long-term Variation of Monthly Mean SST Anomalies



第24図 海域平均海面水温偏差の長期変動

Fig.24 Long-term variations of monthly mean sea surface temperature anomalies (°C) for the areas shown in the right panel. Anomalies are computed from the JMA climatology (1961-90). Thin lines show the monthly mean and thick lines their 13-month running means.





第25図　太平洋赤道域の海面水温偏差時系列図

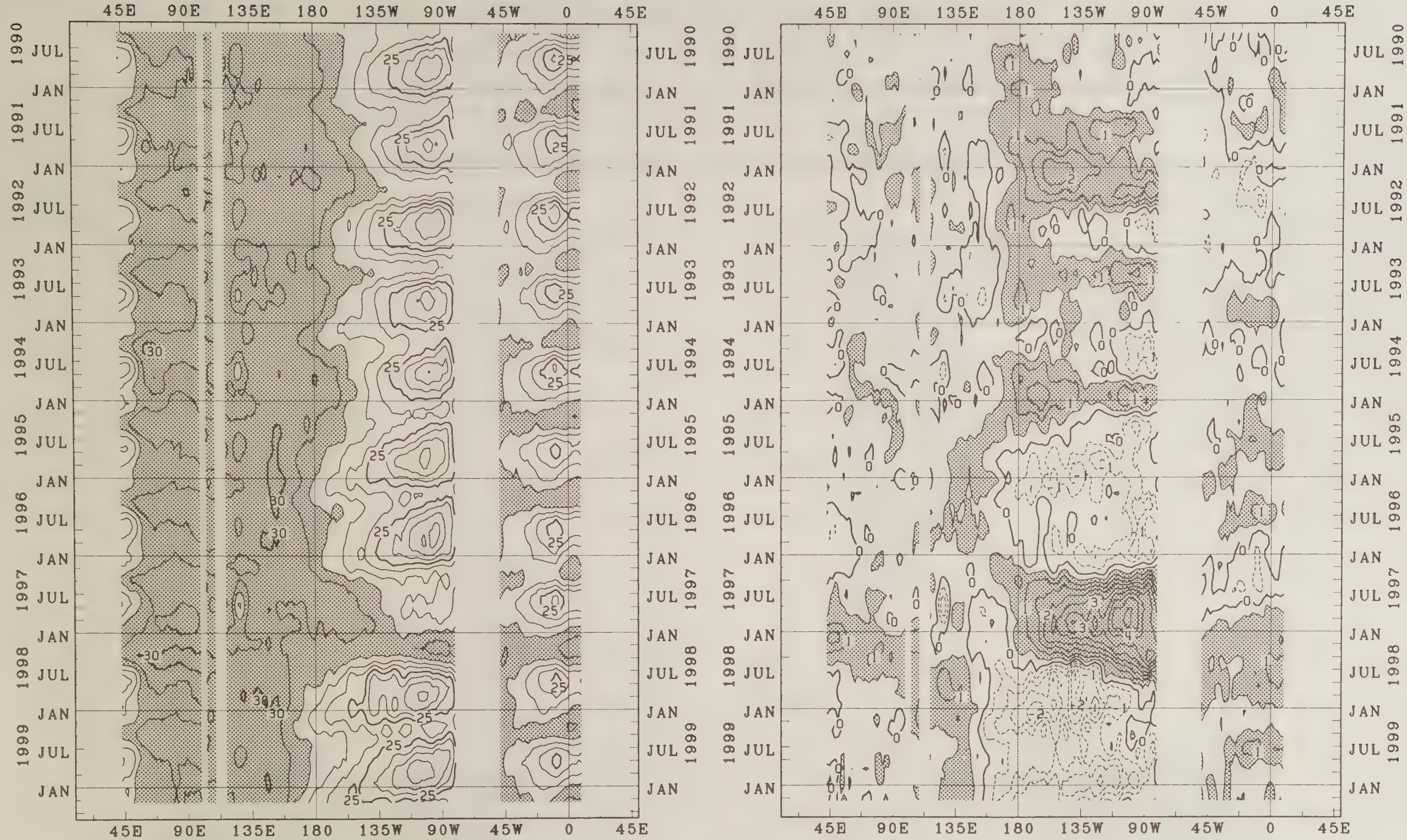
Fig.25 Time series of monthly mean SST anomalies (°C) in the equatorial Pacific Ocean for the areas indicated at the bottom panel. Thin lines show the monthly means and thick lines their 5-month running means. Positive anomalies (A, B, C) and negative anomalies (D) are shaded. Anomalies are computed from the JMA climatology (1961-1990).

El Nino Monitoring Indices

MONTH YEAR	SEA SURFACE TEMPERATURE AND ANOMALY (°C) REGION D 14N-EQ 130E-150E		REGION A 4N-4S 160E-150W		REGION B 4N-4S 150W-90W		REGION C EQ-10S 90W-80W		SOI	SEA LEVEL PRESSURE ANOMALY (hPa) TAHITI 17-33S 149-37W	DARWIN 12-24S 130-52E
JAN 98	28.3	-0.2	29.0	1.0	28.4	3.0	28.0	3.7	-2.3	-3.6	1.4
FEB 98	28.1	-0.2	28.8	0.8	28.8	2.6	28.8	3.1	-1.8	-0.9	3.5
MAR 98	28.3	-0.1	28.6	0.5	29.0	2.1	28.8	2.9	-2.5	-2.8	2.3
APR 98	28.8	0.0	28.5	0.3	28.9	1.8	28.5	3.4	-2.3	-1.5	1.4
MAY 98	29.3	0.2	28.7	0.2	28.3	1.7	27.6	3.7	0.0	0.4	0.5
JUN 98	29.7	0.4	28.4	-0.1	26.1	0.0	24.7	2.0	1.1	0.9	-0.5
JUL 98	29.9	0.7	28.0	-0.5	25.3	0.1	23.2	1.6	1.5	1.8	-0.6
AUG 98	29.9	0.8	27.7	-0.7	24.5	-0.1	21.7	1.1	1.0	1.4	-0.2
SEP 98	30.1	0.9	27.8	-0.5	23.9	-0.7	21.0	0.7	1.0	1.4	-0.4
OCT 98	30.0	0.7	27.3	-1.1	23.8	-0.8	20.8	0.1	1.2	0.8	-1.1
NOV 98	29.9	0.7	27.2	-1.2	24.1	-0.5	21.6	0.1	1.0	0.4	-1.5
DEC 98	29.5	0.6	27.1	-1.1	23.8	-1.1	23.2	0.6	1.5	1.1	-1.5
JAN 99	29.3	0.8	26.4	-1.6	24.2	-1.2	23.9	-0.4	1.5	1.8	-1.5
FEB 99	29.1	0.8	26.7	-1.3	25.5	-0.7	25.9	0.2	0.8	1.3	-0.6
MAR 99	29.3	0.9	27.0	-1.1	26.8	-0.1	26.4	0.5	0.8	0.4	-1.3
APR 99	29.3	0.5	27.3	-0.9	26.7	-0.4	24.1	-1.0	1.8	1.3	-0.9
MAY 99	29.7	0.6	27.8	-0.7	26.4	-0.2	23.8	-0.1	0.3	1.1	1.1
JUN 99	29.7	0.4	28.0	-0.5	25.5	-0.6	21.8	-0.9	0.1	0.6	0.4
JUL 99	29.6	0.4	27.8	-0.7	24.8	-0.4	20.9	-0.7	0.5	1.0	0.1
AUG 99	29.5	0.4	27.8	-0.6	24.0	-0.6	20.0	-0.6	0.0	1.3	1.1
SEP 99	29.7	0.5	27.8	-0.5	23.8	-0.8	19.7	-0.6	-0.1	0.2	0.4
OCT 99	29.8	0.5	27.8	-0.6	23.6	-1.0	20.4	-0.3	1.1	1.2	-0.4
NOV 99	29.7	0.5	27.5	-0.9	23.2	-1.4	20.3	-1.2	1.1	1.2	-0.9
DEC 99	29.4	0.5	27.1	-1.1	23.4	-1.5	22.6	0.0	1.5	1.9	-0.9
JAN 00	29.2	0.7	27.0	-1.0	23.8	-1.6	24.0	-0.3	0.4	1.3	0.3
FEB 00	29.0	0.7	26.6	-1.4	25.3	-0.9	25.9	0.2	1.1	2.6	-0.2
MAR 00	29.1	0.7	26.7	-1.4	26.6	-0.3	25.7	-0.2	1.0	1.6	-0.3

第1表　エルニーニョ監視指数

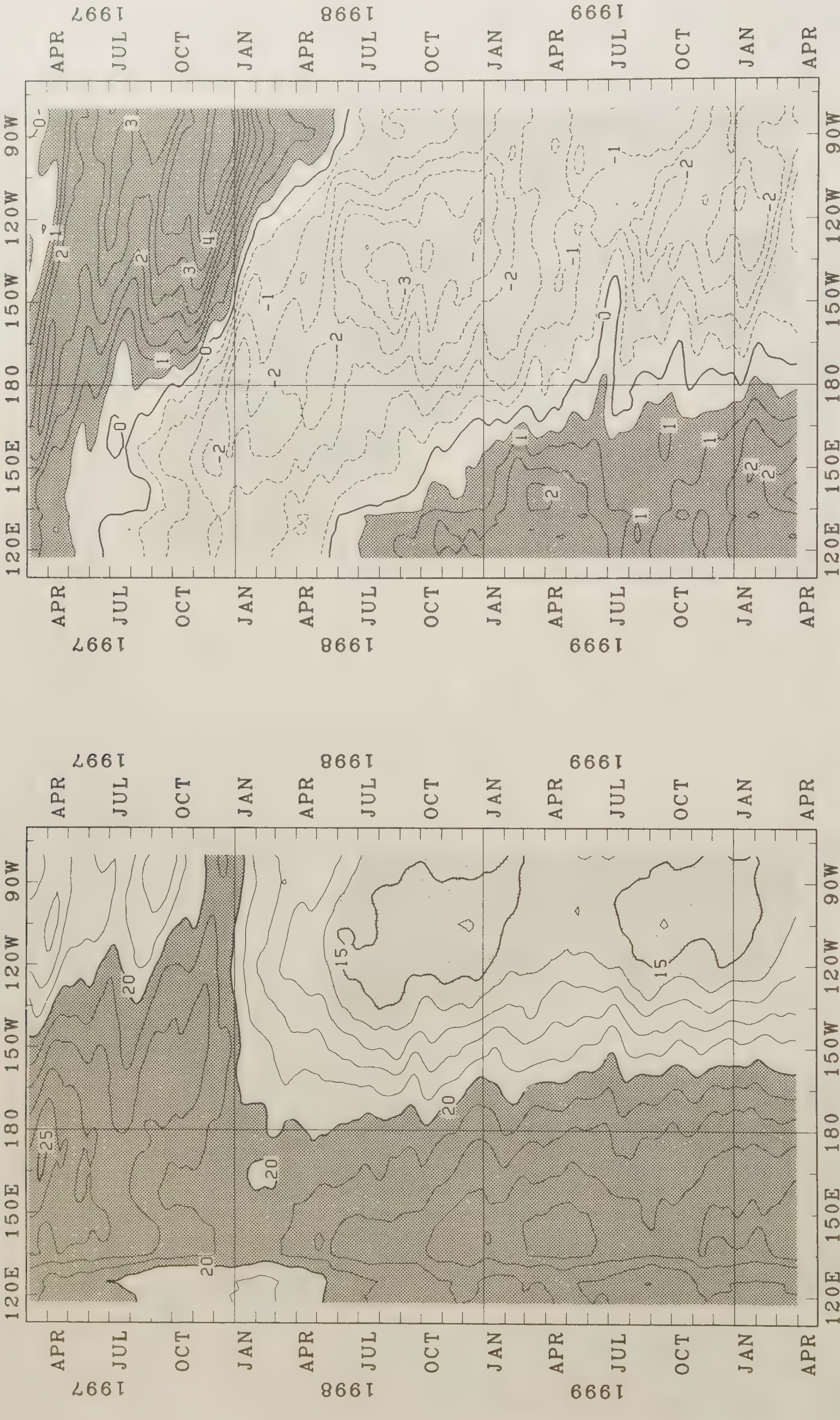
Table 1　El Nino Monitoring indices



第 26 図　赤道に沿った海面水温（左）及び偏差（右）の時間-経度断面図

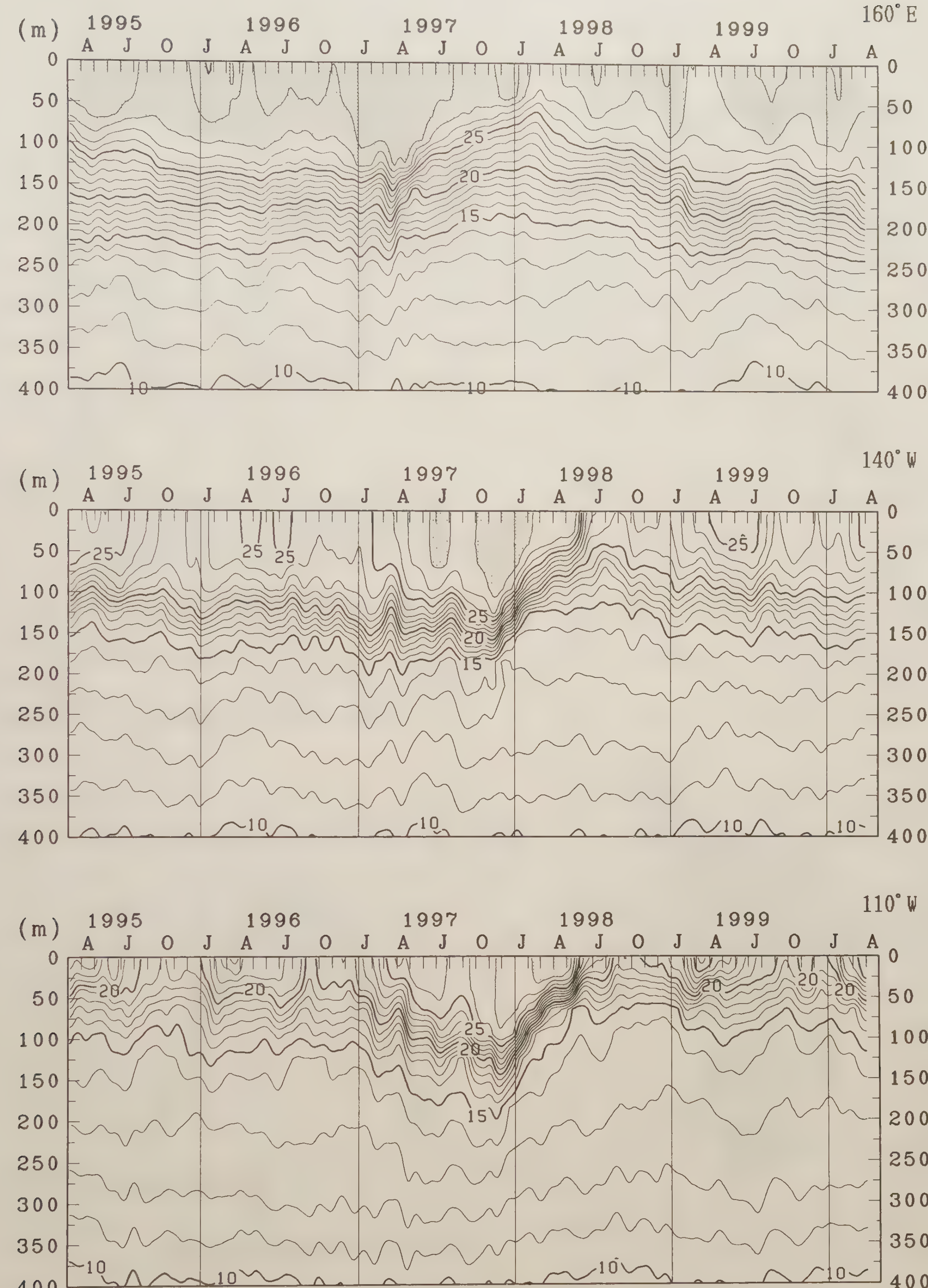
Fig. 26　Time-longitude sections of SSTs (left) and anomalies (right) along the equator (2 °N-2 °S) in the global ocean. Contour interval is 1 ℃ (left) and 0.5 ℃ (right). Values greater than 28 ℃ are shaded and values less than 23 ℃ are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1961-1990 base period means.

Time-Longitude Sections of Ocean Heat Content & Anomalies (Eq.)



第27図　太平洋の赤道に沿う海洋表層の貯熱量（左）及び偏差（右）の時間－経度断面図

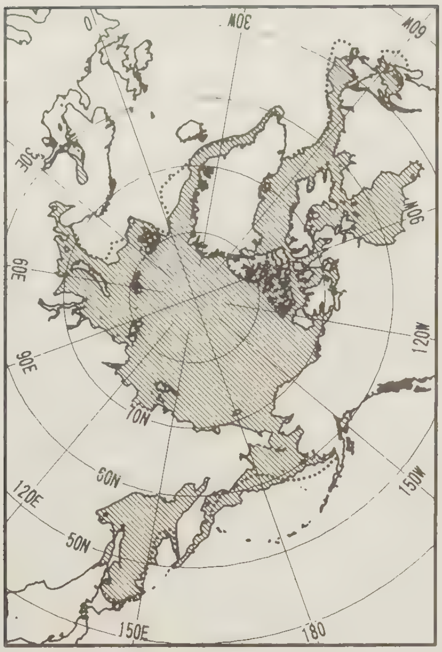
Fig.27 Time-longitude sections of ocean heat content in the upper 260 m along the equator (left) and anomalies (right) in the Pacific Ocean. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (left) and 0.5°C (right). Values greater than 20°C are shaded and values less than 16°C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1987-1998 base period means.



第28図　太平洋赤道域の表層水温の時間－深度断面図

（上：西部、中：中部、下：東部）

Fig.28 Time-depth sections of equatorial subsurface temperature for the western Pacific (top, 160°E), the central Pacific (middle, 140°W) and the eastern Pacific (bottom, 110°W). Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C. Values greater than 28°C are shaded.

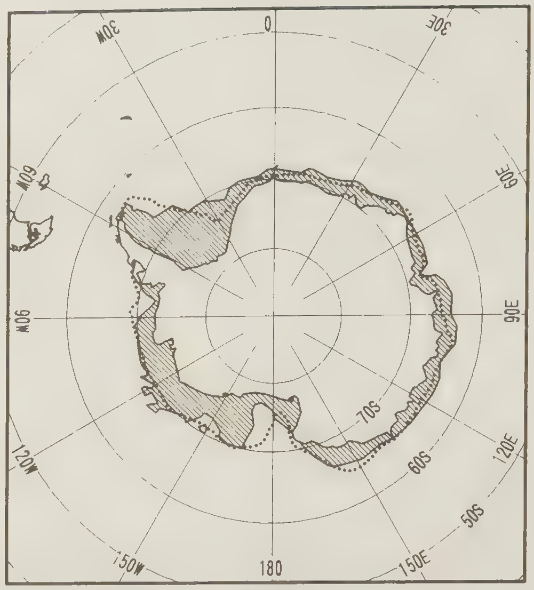


第29-1図　北極域の海氷図（2000年 3月17日）

Fig.29-1 Sea ice chart in the Arctic on 17 Mar. 2000.

The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1972 through 1990.

The data source is the National Ice Center (USA).

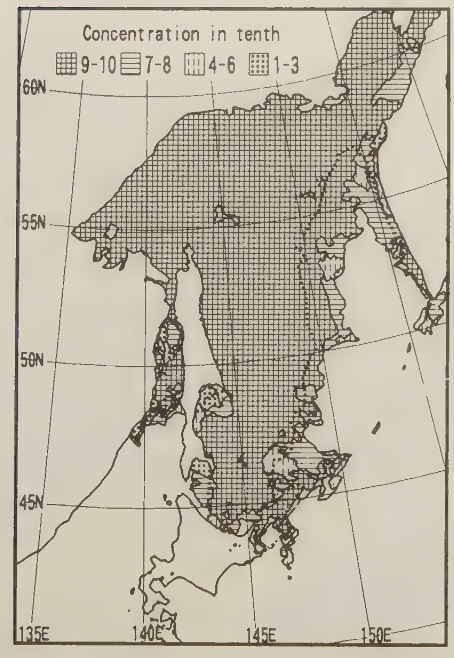


第29-2図　南極域の海氷図（2000年 3月17日）

Fig.29-2 Sea ice chart in the Antarctic on 17 Mar. 2000.

The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1973 through 1990.

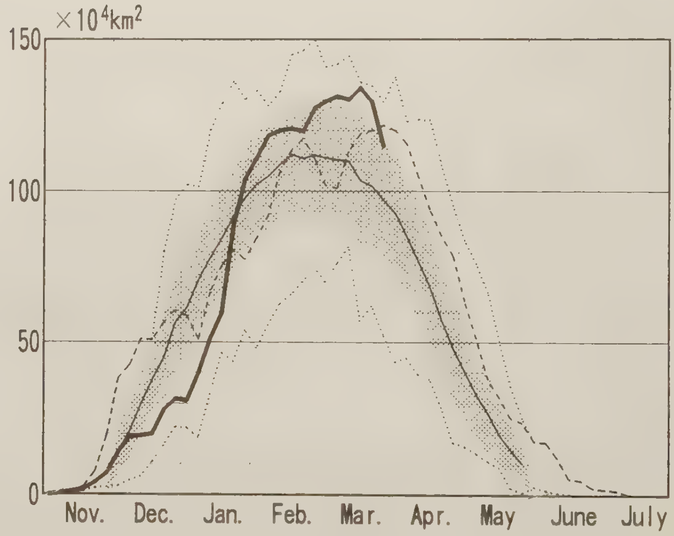
The data source is the National Ice Center (USA).



第29-3図 オホーツク海の海氷図（2000年 3月15日）

Fig.29-3 Sea ice chart in the Sea of Okhotsk on 15 Mar. 2000.

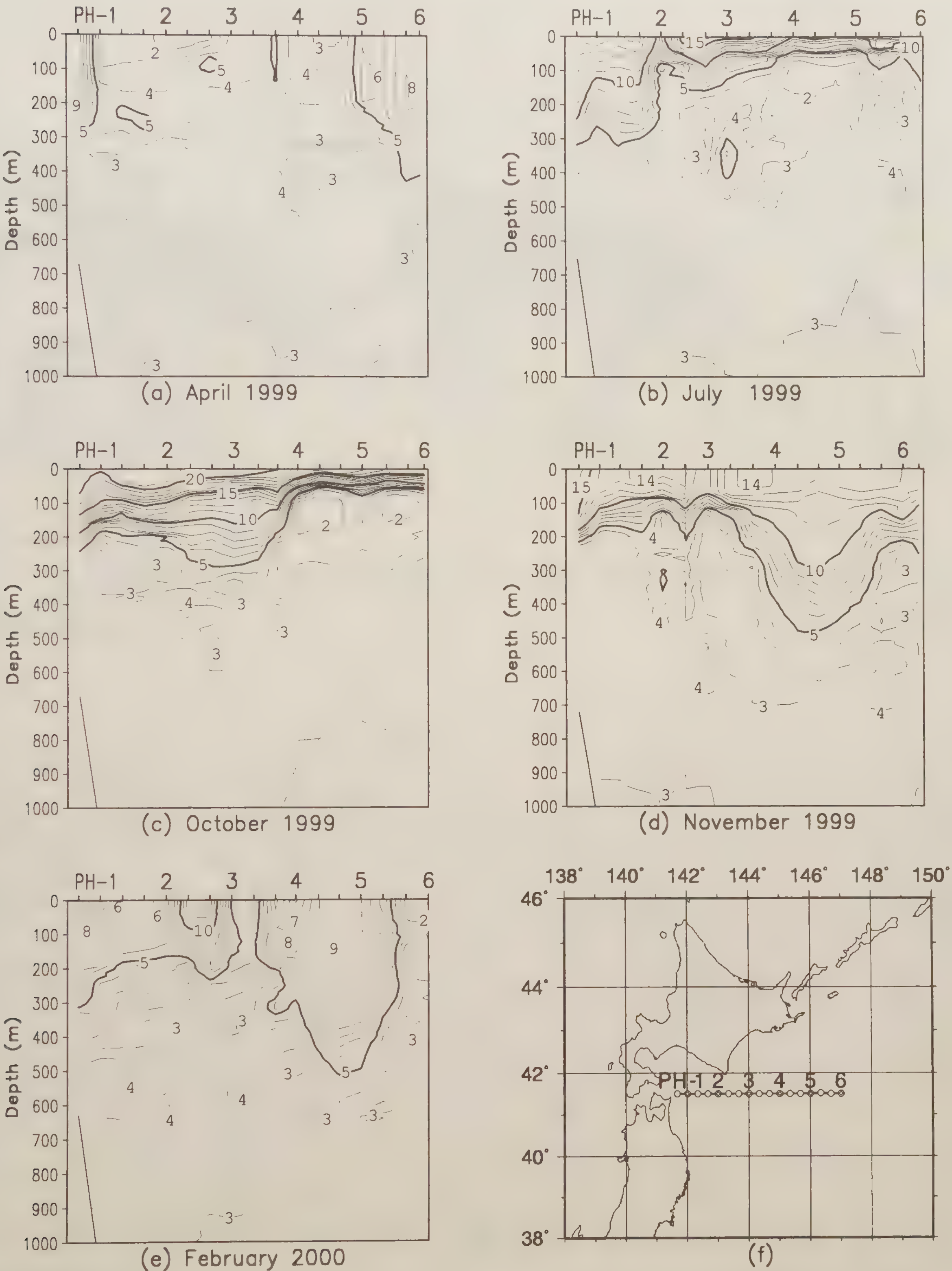
The dotted line denotes the mean ice edge averaged for the period from 1971 through 1995.



第29-4図 オホーツク海の海氷域面積

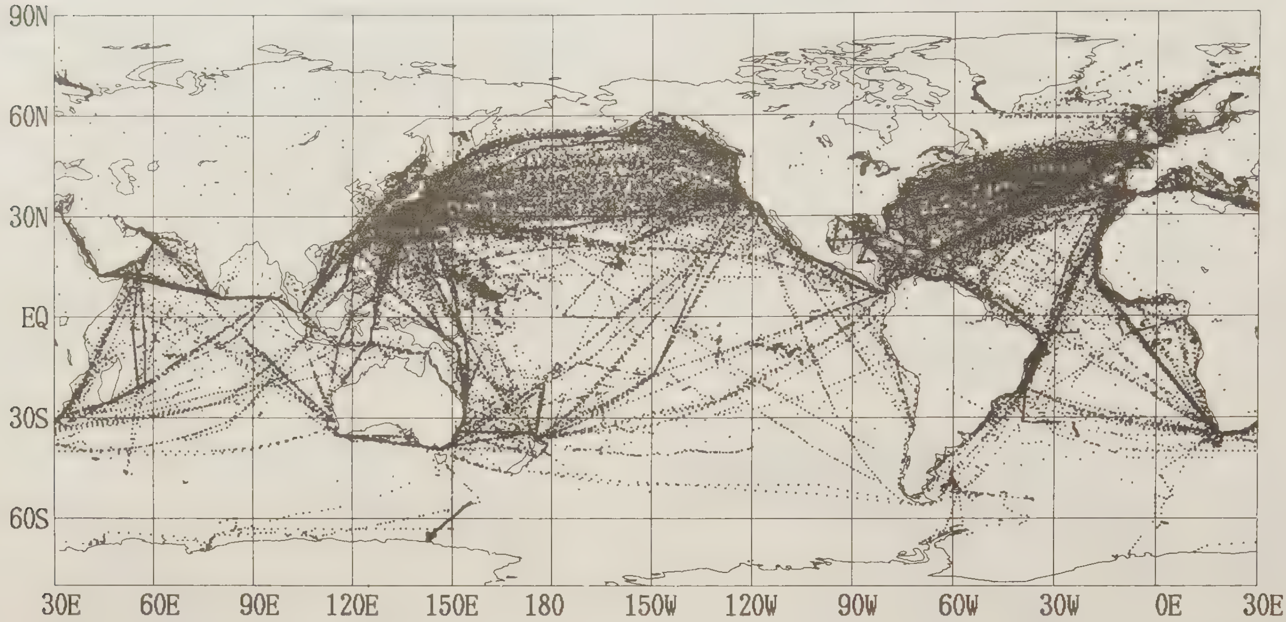
Fig.29-4 Time-series of 5-day sea ice extent in the Sea of Okhotsk.

―――― : current season (1999/2000)
―――― : mean extent (1971–1995)
·············· : maximum or minimum extent (1971–1999)
------------ : last season (1998/1999)
░░░░ : mean $\pm 1\sigma$ (1971–1995)

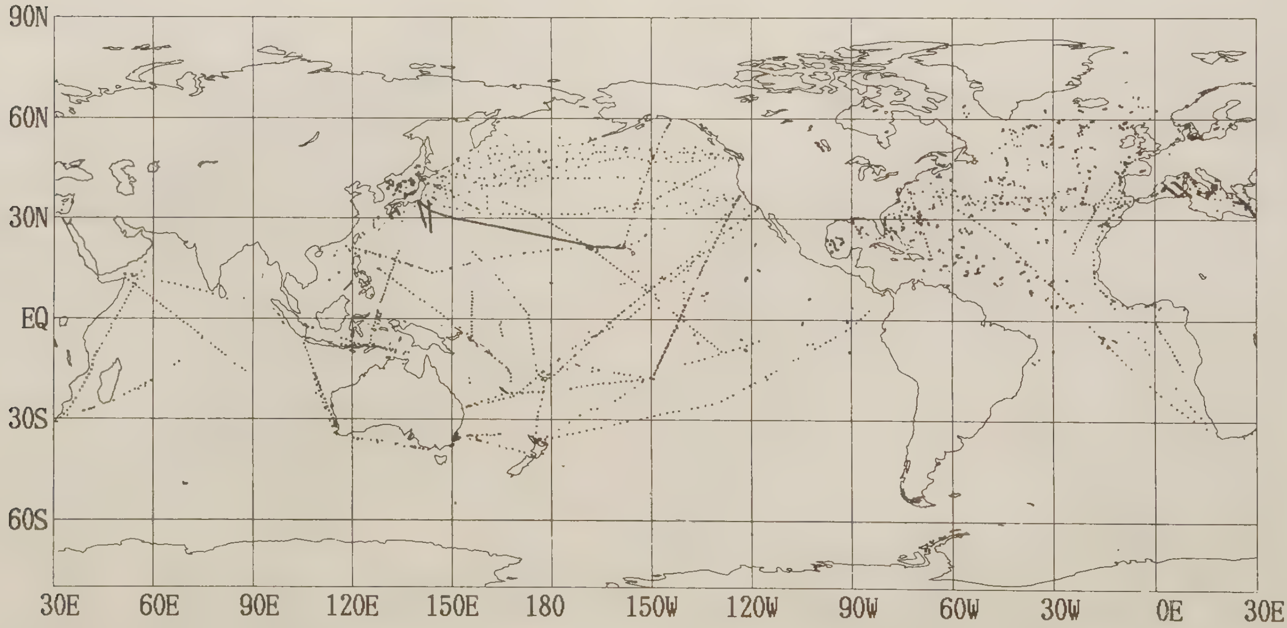


第 30 図　函館海洋気象台高風丸によるPH線に沿った水温鉛直断面図.（a）1999年4月、（b）1999年7月、（c）1999年10月、（d）1999年11月、（e）2000年2月、（f）PH線の位置図

Fig.30 Vertical sections of temperature(℃)along the PH line observed by R/V Kofu maru of Hakodate Marine Observatory of the Japan Meteorological Agency. (a)April 1999, (b)July 1999, (c)October 1999, (d) November 1999, (e) February 2000, (f)Location of the PH line.



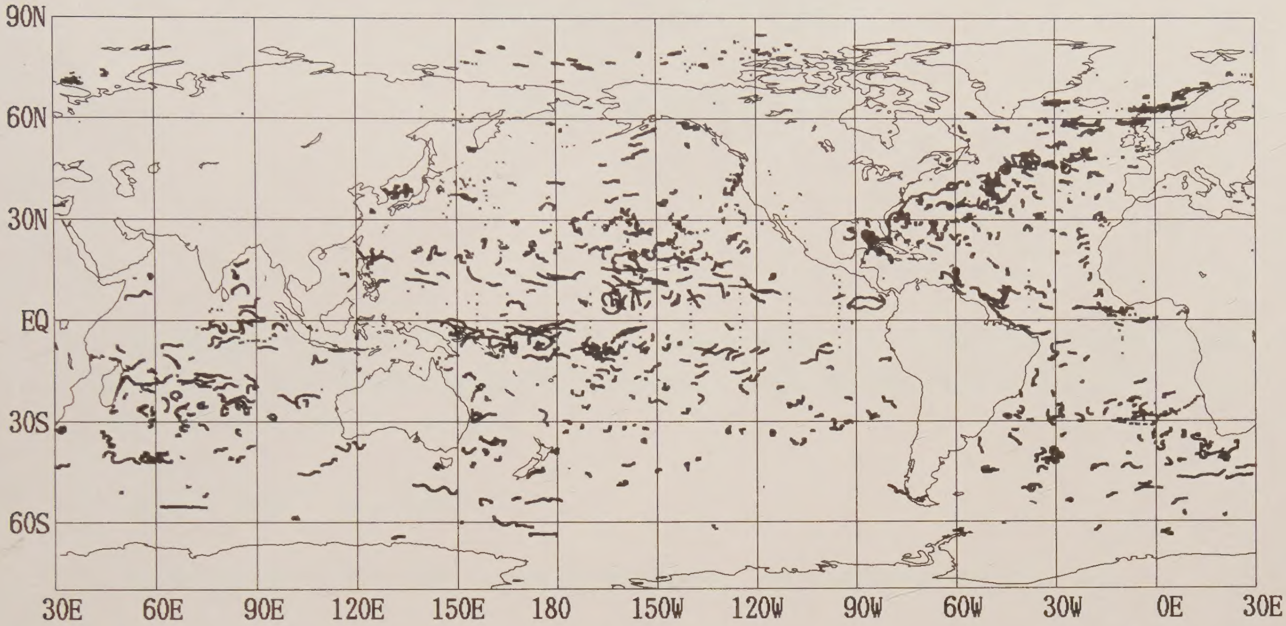
SHIP messages Total data:123689



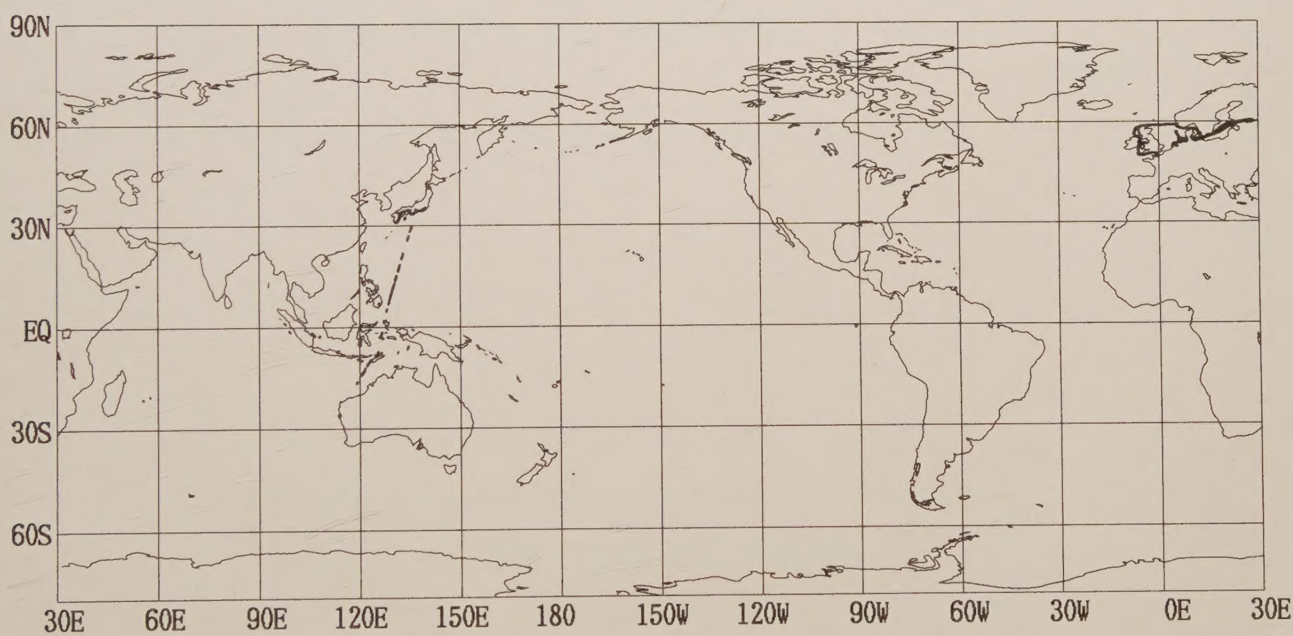
BATHY/TESAC messages Total data: 3677

第31-1図　測点分布図(2000年 3月)

Fig.31-1　Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for MAR 2000.



BUOY messages Total data:274238



TRACKOB messages Total data: 791

第31-2図　測点分布図(2000年 3月)

Fig.31-2 Geographical distribution of BUOY messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for MAR 2000.

気象庁海洋月報

Monthly Ocean Report

March 2000 (No. 87)

本月報掲載の 2000 年 3 月のプロダクトには、気象庁が観測したデータ及び GTS（全球気象通信網）を通じて入手した国際気象通報式による通報のほか、下記の機関等から提供いただいたデータを使用しています。御礼申し上げます。

防衛庁、水産庁、海上保安庁

海洋科学技術センター、（財）日本海洋科学振興財団、（社）漁業情報サービスセンター

東北大学、鹿児島大学

水産試験場等（北海道、青森県、岩手県、宮城県、秋田県、山形県、茨城県、東京都、新潟県、富山県、石川県、福井県、静岡県、愛知県、三重県、京都府、兵庫県、和歌山県、鳥取県、島根県、山口県、長崎県、宮崎県）

（順不同）

平成１２年４月２０日発行

編集兼　気　象　庁
発行所　東京都千代田区大手町１-３-４

印刷所　モリモト印刷株式会社
東京都新宿区東五軒町３-１９